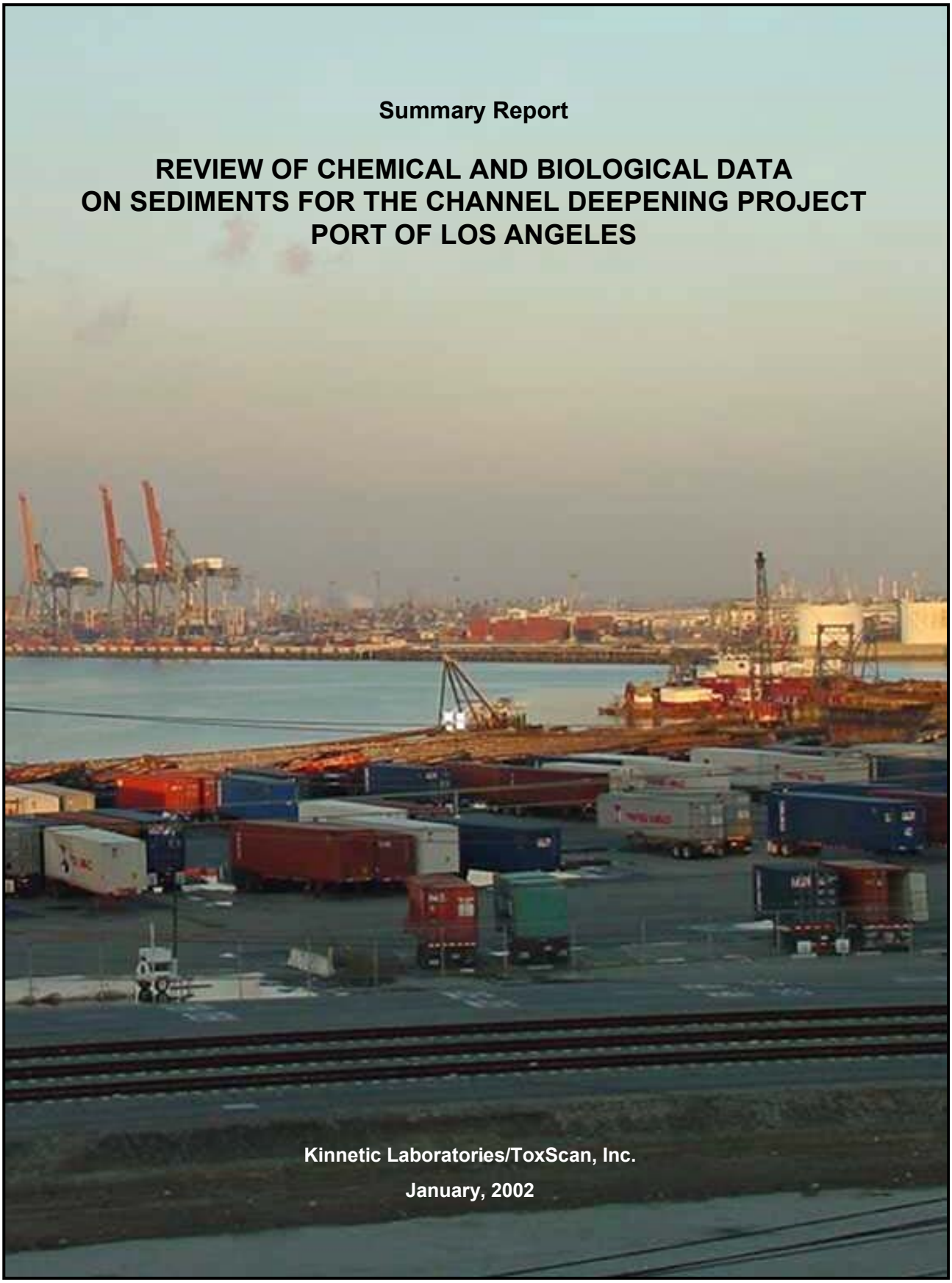


Summary Report

REVIEW OF CHEMICAL AND BIOLOGICAL DATA ON SEDIMENTS FOR THE CHANNEL DEEPENING PROJECT PORT OF LOS ANGELES

Kinnetic Laboratories/ToxScan, Inc.

January, 2002

Summary Report

REVIEW OF CHEMICAL AND BIOLOGICAL DATA ON SEDIMENTS FOR THE CHANNEL DEEPENING PROJECT PORT OF LOS ANGELES

Prepared for:

Port of Los Angeles
San Pedro, CA

and

DMJM-Harris
Long Beach, CA

Kinnetic Laboratories/ToxScan, Inc.
January 2002

Summary Report

REVIEW OF CHEMICAL AND BIOLOGICAL DATA ON SEDIMENTS FOR THE CHANNEL DEEPENING PROJECT

Kinnetic Laboratories/ToxScan, Inc.
January, 2002

Table of Contents

Page No.

APPENDICES (continued)

A-2 Results of Physical, Chemical, and Bioassay Testing of Sediments Collected for the Port of Los Angeles Modified Channel Deepening Program (MEC, 2001a)

Appendix B: Southwest Slip Area

B-1 Chemical and Biological Analysis of Sediments in the Southwest Slip Project Area (KLI/ToxScan, 2002)

Appendix C: Outer Harbor

C-1 Grab Sample Data, Shallow Water Habitat Extension (KLI/ToxScan, 2002)

C-2 Previous Sediment Quality Data from the Area of the Proposed Cabrillo Shallow Water Habitat Extension and from the Proposed Pier 400 Submerged Materials Storage Area (KLI, 1991).

List of Figures and Tables

Page No.

1.0 EXECUTIVE SUMMARY

Summary Report

REVIEW OF CHEMICAL AND BIOLOGICAL DATA ON SEDIMENTS FOR THE CHANNEL DEEPENING PROJECT

Kinnetic Laboratories/ToxScan, Inc.
January, 2002

1.0 EXECUTIVE SUMMARY

Project Description. The U.S. Army Corps of Engineers in conjunction with the Los Angeles Harbor Department is proposing (USACE, 2000) to carry out deepening of the Main Channels and selected areas in the Port of Los Angeles inner harbor to a depth of 53 feet plus 2 feet over dredge (-55 feet MLLW).

Sites considered for disposal of the sediments to be dredged from the channels include the landfills of another project, the Southwest Basin development, particularly with respect to disposal of channel sediments unsuitable for ocean disposal. Other reuse or storage opportunities within the Port include the expansion of the Cabrillo Shallow Water Habitat area near the San Pedro breakwater in the outer Harbor, expansion of the Pier 300 landfill, and a submerged material storage site adjacent to the Pier 400 landfill. Offshore ocean disposal at the LA-3 disposal site is an option for clean dredge materials. However, no ocean disposal of dredged materials is currently proposed. All sediments will be disposed of at disposal sites within the Harbor as described above.

Purpose of This Report. The purpose of this data review is to collect and present sediment testing results for all of the sediments involved in this Channel Deepening Project. Data were developed for all of the dredge areas identified. These dredge material testing units are illustrated in Figure 1.

Sediment Testing Results. Sediments from the test units were sampled by vibracores and subjected to physical, chemical, and biological testing. Test protocols and evaluation criteria for dredge materials were used as specified by the U.S. Environmental Protection Agency and by the U.S. Army Corps of Engineers (USEPA/USACE 1991; 1998). Sediments were deemed unsuitable for ocean disposal if these evaluations concluded that the given sediment unit did not meet criteria for open water disposal.

Four dredge areas unsuitable for ocean disposal were identified. These areas are listed below and shown on Figure 1:

- Area FM-1 in the Main Channel
- Area FG-2B in the West Basin
- Southwest Slip Dike and Basin Area
- Area A-1, Lower End of proposed Linear Berth (Berth 100 South Extension)

Sediments from dredge units FG-2B and FM-1 were only moderately contaminated, with a few metals and organic contaminant concentrations exceeding NOAA (Long et al., 1995) ERL or ERM guidance values. These sediments are being dredged for the purpose of deepening navigational channels.

Sediments within area FG-2B in the West Basin were found to contain levels of mercury, nickel, DDT compounds, and PCBs in excess of ERL guidance values. However, significant toxicity was measured with a benthic amphipod test. Bioaccumulation test results showed lead, mercury, DDD, and PCBs bio-accumulated in test tissues to significant levels.

Sediments in area FM-1 showed metal levels to be elevated, more so than for either the coarse- or fine-grained materials tested from the inner reaches of the Main Channel. Organic compounds (DDTs and PCBs) were elevated to relatively high levels and were greater than other dredged materials in the Main Channel. Supplemental sampling of these materials demonstrated that the metals were found primarily in the formation (lower layer) materials while the organic compounds were distributed primarily in the depositional (top layer) materials. Significant toxicity was measured in two benthic toxicity tests, while slight bioaccumulation of copper, mercury, and lead occurred. USEPA concluded (USEPA, 1998a) that the surface depositional materials within the FM-1 area were not suitable for open water disposal but that the formation materials are suitable for open water disposal. Furthermore, USEPA (1998b) delineated two pockets of the surface material that are suitable for unconfined aquatic disposal. These suitable areas were in the northwestern corner and in the southeastern area of the FM-1 area. Recent sampling of the area just south of the Pilot Station (MEC, 2002) showed that these sediments were suitable for ocean disposal.

Sediments in the Southwest Slip were highly contaminated, most with pronounced petroleum odors, and all with very high concentrations of metals, petroleum hydrocarbons and PAHs, high DDT compounds, and high PCBs. Sediments in the small Area A-1 (Berth 100 South Extension) showed moderate contamination. These sediments in the Slip and along the proposed pier face need to be dredged for dike keys, and for minor reconfiguration of the bottom of the Slip where new fill is not to be placed at this time.

Sediments from these dredge units deemed unsuitable for ocean disposal will need to be placed within a fill area. Elutriate and suspended phase bioassay test results from all the dredge areas indicate that adverse water quality impacts would not be expected during open water disposal, or from decant water from a confined landfill.

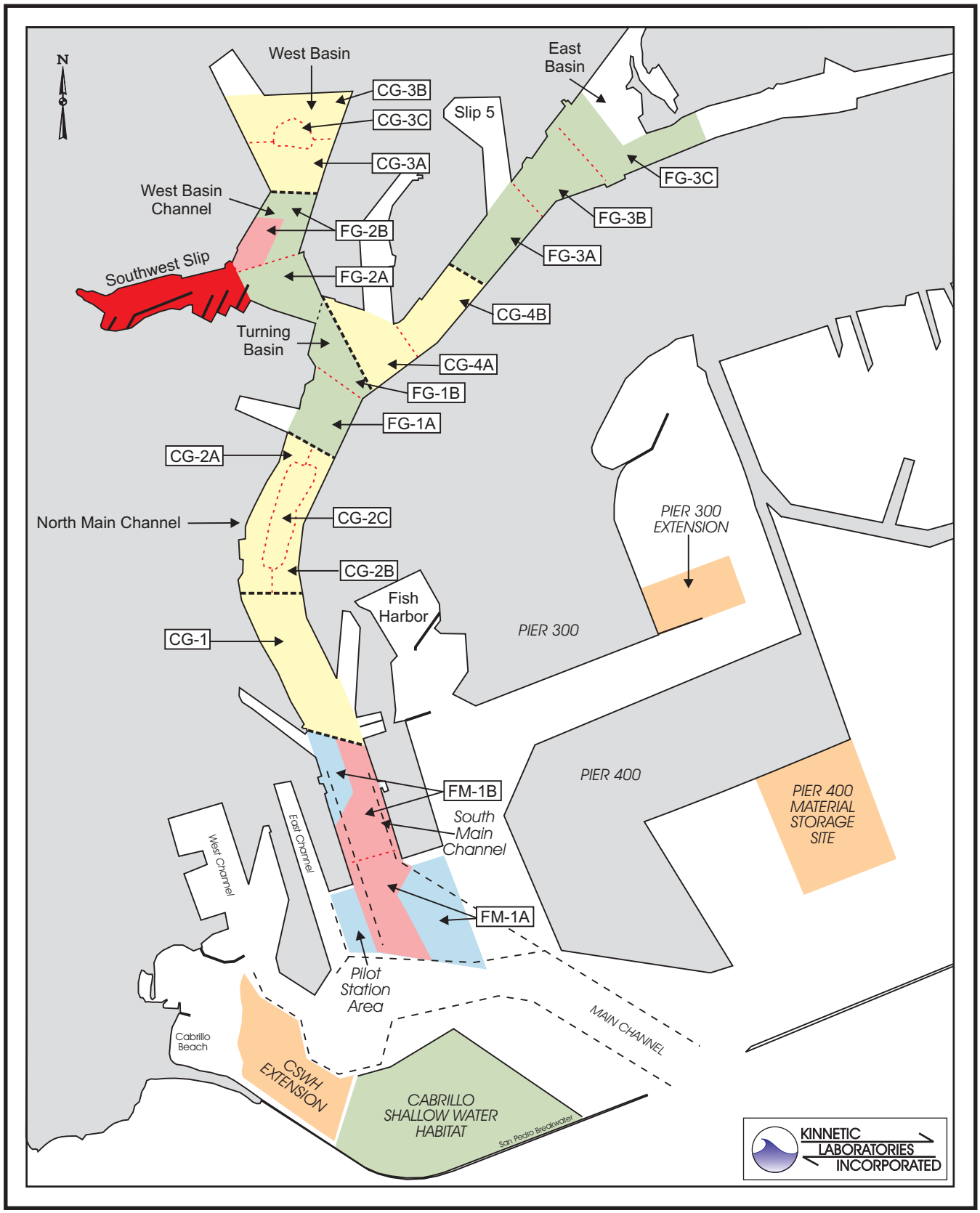


Figure 1. Dredge Material Test Units, Port of Los Angeles.

2.0 DATA SOURCES

2.0 DATA SOURCES

The data sources for sediment quality data for all sediments that need to be dredged and reused or disposed of for this project are cited and discussed in sections below, and detailed data are summarized in the attached Appendices. Detailed maps are also given in each of the Appendices.

The major source for sediment quality data for the main channels in the Inner Harbor is a study done by the Port of Los Angeles in 1997 in anticipation of channel deepening (KLI/ToxScan, 1996; 1997). The original channel deepening testing was done to a design depth of –50 feet MLLW, plus a 2-foot overdredge allowance to a total depth of -52 feet MLLW. Previously, a small area of the main channel where sand resources exist was explored in 1996 and later partially mined for borrow material for the construction of Pier 400. The present proposal is to dredge to a total depth of -55 feet MLLW (including two feet of overdredge). Recent regulatory considerations have allowed a Tier I exemption from further testing for this deeper layer under dredge units that were deemed to be suitable for ocean disposal in the earlier testing, and required further testing under certain units deemed not suitable for ocean disposal (MEC, 2001a). This further testing was subsequently carried out (MEC, 2001a).

In addition, a small area that lies south of the Pilot Station was proposed for dredging and was also tested in 2001 (MEC, 2001a).

The required fill for the Southwest Slip terminal development project was proposed as a disposal site for sediments dredged from the main channel. In particular, those sediments deemed to be unsuitable for ocean disposal need to be placed in a landfill.

Additional testing of sediments local to the Southwest Slip area was also required, as dredging within the slip is necessary to provide keys for dike placements, to reshape an existing storm water channel that discharges through the Southwest Slip, and to remove some high spots in the Southwest Slip. Additional coring and testing was carried out in August 2001 to characterize these Southwest Slip area sediments (KLI/ToxScan, 2002). A few surface sediments in the area of the Cabrillo Shallow Water Habitat Extension, proposed as an additional disposal site for clean sediments, were also tested.

3.0 SEDIMENT TESTING RESULTS

3.0 SEDIMENT TESTING RESULTS

The results of the sediment testing carried out to support the Port of Los Angeles Channel Deepening along with associated disposal options, are summarized briefly below. Dredge test units are shown in Figure 1, and more detailed maps of dredge test units are given in the relevant Appendix.

More detailed information is supplied in the summary data appendices from these different studies attached to this report, and organized according to the original reports. In general, these summary appendices include the dredge unit composite test results, but not those of every individual core sample. These appendices include maps and positioning information for sediment cores taken, and include summary tables of the chemical and biological test results for each study.

Chemical concentrations of contaminants found within the sediments are compared to sediment quality guidelines (Long et al., 1995) developed by NOAA. For any given contaminant the Effects Range Low (ERL) guideline represents the 10^{th} percentile concentration value in the NOAA data base that might be expected to cause adverse biological effects and the Effects Range Medium (ERM) reflects the 50^{th} percentile value in the data base. In addition, toxicity and bioaccumulation testing was carried out to directly measure biological effects using standard dredge material protocols (USEPA/USACE 1991; 1998). If toxicity or bioaccumulation effects were measured, then the sediments were deemed "unsuitable for ocean disposal". Sediments were also used to prepare elutriates (essentially a 4/1 vol/vol ambient seawater extraction) which were subjected to chemical analysis and/or suspended phase toxicity testing to determine potential water quality effects during dredging or disposal operations. Concentrations of contaminants in the elutriates are compared to water quality standards to determine whether such standards are exceeded with or without expected dilutions. These standards are written in terms of dissolved constituents. Suspended phase toxicity results are also interpreted as to whether Limiting Permissible Concentrations (LPC) values are exceeded (e.g. whether toxicity would be present at expected dilutions).

3.1 Main Channel

Sediments existing in the Main Channel of the Port of Los Angeles have been characterized and the testing results reported in "Environmental Evaluation of Sediments for the Channel Deepening Program, Port of Los Angeles", KLI/ToxScan, 1997. These data were supplemented by recent data obtained in the dredge sub-area FG-2B for deeper sediments between - 52 to -55 feet MLLW because it is now proposed to go to these deeper depths (MEC, 2001a). This more recent study also obtained data from a second area immediately south of the Port Pilot's station at the entrance to the inner harbor, to the west of previous cores taken in the dredge sub-area FM-1 (MEC, 2001a). In addition, recent data have also been taken for the sediments at the Berth 100 side of the proposed Southwest terminal (MEC, 2001b) that is part of a separate, on-going project. Finally, sediments within the Southwest Slip have been characterized (KLI/ToxScan, 2002). Maps of the dredge areas tested in the above cited references are included in Appendix B.

3.1.1 Areas Unsuitable for Ocean Disposal

Two areas of the Main Channel have been identified where sediment dredge materials unsuitable for ocean disposal exist. These areas are listed below:

- Area FG-2B in the West Basin
- Area FM-1 in the Main Channel

Area FG-2B in the West Basin

Sediments within the dredge area FG-2B were judged (USEPA, 1998a) to be suitable for open water disposal except for a sub-area around test cores FG2-6 and FG2-8 in the southwest area of FG-2B. Sediments within this subarea were found to contain levels of mercury, nickel, and DDT compounds in excess of ERL guidance values, and DDE and PCBs in excess of ERM guidance values. Significant toxicity was measured with a benthic amphipod test and bioaccumulation test results that showed that lead, mercury, DDD, and PCBs bio-accumulated in test tissues. This led to the conclusion that this southwestern sub-area of FG-2B sediments, represented by test cores FG2-6 and FG2-8, would not be suitable for open water disposal. The remainder of Area FG-2B, judged to be suitable for open water disposal, is discussed in Section 3.1.2 of this summary.

Elutriate tests were not run on these sediments, but suspended phase bioassays showed that adverse water quality impacts would not be expected during open water disposal, or from decant water from a confined landfill.

Area FM-1 in the Main Channel

The bulk chemistry results for these materials showed metal levels to be elevated, more so than for either the coarse- or fine-grained materials from the inner reaches of the Main Channel. Organic compounds (DDTs and PCBs) were elevated to relatively high levels and were greater than other tested materials in the Main Channel. Supplemental sampling of these materials demonstrated that the metals were found primarily in the formation (lower layer) materials while the organic compounds were distributed primarily in the depositional (top layer) materials. Significant toxicity was measured in two benthic toxicity tests, while slight bioaccumulation of copper, mercury, and lead occurred. USEPA concluded (USEPA, 1998a) that the depositional layers within the FM-1 area were not suitable for open water disposal but that the formation materials are suitable for open water disposal.

Furthermore, USEPA (1998b) delineated two pockets of material in the depositional layer that are suitable for unconfined aquatic disposal. These suitable areas were in the northwestern corner (within Area FM-1B) and in the southeastern portion (within Area FM-1A) of the FM-1 region, and are discussed in Section 3.1.2 of this summary.

Elutriate tests were not run on these sediments. Suspended particulate phase bioassays showed that either no dilution or a low dilution value would assure that adverse water quality impacts would not be expected from disposal operations, or from decant water from a confined landfill.

3.1.2 Areas Suitable for Ocean Disposal

In the Main Channel areas (Appendices A-1 & A-2), except for the dredge units identified above that contain materials unsuitable for ocean disposal, all sediments tested were judged to be suitable for open water disposal or for use as fill material. The coarse grained materials are valuable as fill material because of their better structural properties. The upper-layer, finer grained materials that were judged not to be contaminated are less desirable as fill, but could be used either for fill or disposed of at an approved open-water site.

Elutriate and suspended phase bioassay results on these materials indicated that water quality impacts would not be expected during open water disposal, or from decant water from a confined landfill disposal area.

Dredge Material Unit CG-1

Ten sediment cores (KLI/ToxScan, 1996; Appendix A-1) were collected and combined into two composite areas (CG-1A and CG-1B). Each composite was vertically divided to form top (mudline to -52' MLLW) and bottom (-52' to -60' MLLW) subunits.

Sediment chemical analysis showed DDE and total DDTs > ERLs in both top composites, and no ERL exceedance in either bottom composite.

Both bottom elutriates showed copper slightly in excess of water quality standards without dilution.

No biological testing was performed, since testing was designed to assess sediment suitability for use as fill in Pier 400 as these were coarse-grained materials. Detailed results are presented in KLI/ToxScan 1996.

Dredge Material Unit CG-2

Fourteen sediment cores were collected and combined into three composite areas (CG-2A (5 cores), CG-2B (5 cores) and CG-3C (4 cores). A and B composites were vertically divided to form top (mudline to -52' MLLW) and bottom (-52' to about -65' MLLW) subunits. In the CG-3 composite area, mudline was about -50' MLLW, so only a bottom composite was formed (mudline to about -65' MLLW).

Sediment chemical analysis of the CG- 2A top composite showed DDE and total DDTs > ERMs and copper, mercury and total PCBs > ERLs. The CG-2B top composite showed DDE, total DDTs and total PCBs > ERLs. The CG-2A bottom composite showed no

ERL or ERM exceedances, while the CG-2B and CG-2C bottom composites showed DDE and total DDTs > ERLs.

None of the elutriates showed contaminants in excess of water quality standards. No biological testing was performed, since testing was designed to assess sediment suitability for use as fill.

No biological testing was performed, since testing was designed to assess sediment suitability for use as fill as these are coarse-grained materials. Detailed results are presented in KLI/ToxScan, 1997.

Dredge Material Unit CG-3

Thirteen sediment cores were collected and combined into three composite areas (CG-3A (5 cores), CG-3B (5 cores) and CG-3C (3 cores).) A and B composites were vertically divided to form top (mudline to -52' MLLW) and bottom (-52' to about -65' MLLW) subunits. In the CG-3C composite area, mudline was about -50' MLLW, so only a bottom composite was formed (mudline to about -65' MLLW).

Sediment chemical analysis of the CG-3A top composite showed copper, mercury, nickel, DDE, total DDTs and total PCBs > ERLs . The CG-3B top composite showed DDE and total PCBs > ERMs, as well as mercury, total DDTs, total PAHs and HPAHs > ERLs. The CG-3A and CG-3B bottom composites showed no ERL or ERM exceedances, while the CG-3C bottom composite showed DDE, total DDTs and total PCBs > ERLs.

None of the elutriates showed contaminants in excess of water quality standards. No biological testing was performed, since testing was designed to assess sediment suitability for use as fill.

No biological testing was performed, since testing was designed to assess sediment suitability for use as fill because these are coarse-grained materials. Detailed results are presented in KLI/ToxScan , 1997.

Dredge Material Unit CG-4

Ten sediment cores were collected and combined into two composite areas CG-4A (5 cores), and CG-4B (5 cores). Both composites were vertically divided to form top (mudline to -52' MLLW) and bottom (-52' to about -65' MLLW) subunits.

Sediment chemical analysis of the CG-4A top composite showed DDE > ERM and total DDTs and total PCBs > ERLs. The CG-4B top composite showed DDE, total DDTs and total PCBs > ERLs. The CG-4A bottom composite showed mercury, DDE, total DDTs and total PCBs > ERLs. The CG-4B bottom composite showed only nickel > its ERL

None of the elutriates showed contaminants in excess of water quality standards. No biological testing was performed, since testing was designed to assess sediment suitability for use as fill.

No biological testing was performed, since testing was designed to assess sediment suitability for use as fill as these were coarse grianed materials. Detailed results are presented in KLI/ToxScan, 1997.

Dredge Material Unit FG-1

Twenty sediment cores were collected (two at each of ten locations) within area FG-1 and combined into two composite samples FG-1A (5 locations) and FG-1B (5 locations). Sampling was performed from mudline to -52' MLLW, and there was no vertical subdivision.

Sediment chemical analysis of the FG-1A composite showed copper, mercury, total DDTs and total PCBs > ERLs, and DDE > ERM. The FG-1B composite showed mercury, nickel, total DDTs and total PCBs > ERLs, and DDE > ERM.

Water column toxicity tests showed that undiluted elutriates of both FG-1A and FG-1B composites produced statistically significantly decreased survival of mussel larvae compared with dilution water controls. However, the decreased survival was small in magnitude with the LC50 for both elutriates >100%. Therefore the Limiting Permissible Concentration (LPC) was not exceeded (USEPA/USACE 1991; 1998). There was no other significant toxicity result, neither water column nor benthic for either sediment composite.

Bioaccumulation assessments using *Macoma* (clam) showed that the FG-1A composite produced minor but statistically significant elevation of lead, mercury and DDD over LA2 and LA3 reference tissue levels, and of DDE over LA3 reference. The FG-1B composite produced elevated lead over both references and elevated benzo(b)fluoranthene (over LA2) and DDE (over LA3). *Nereis* tissues showed no increased contaminant levels over LA2 reference, but showed elevated lead (FG-1A) and lead and DDE (FG-1B) over LA3 reference.

In general, the tissue concentration of the metals and organic compounds in both species were in the range of 1.5 to 3x those in tissue from LA2 and LA3 reference sites. Many of the significant increases were influenced by the arbitrary assignment of numerical values equal to 50% of reporting limits to tissues in which an analyte was not detected. Evaluation of these data concluded that these materials were suitable for ocean disposal (USEPA, 1998a). Detailed results are presented in KLI/ToxScan, 1997.

Dredge Material Unit FG-2

Twenty sediment cores were collected (two at each of ten locations) within area FG-2 and combined into two composite samples FG-2A (5 locations) and FG-2B (5 locations).

Sampling was performed from mudline to -52' MLLW, and there was no vertical subdivision.

Sediment chemical analysis of the FG-2A composite showed DDE, total DDTs and total PCBs > ERLs, respectively.

Water column bioassays showed that undiluted elutriate of FG-2A composite sediments produced no significant deleterious effects to mussel larvae, mysids, or fish compared with dilution water controls. Benthic bioassays showed no significant mortality to amphipods, worms, or mysids after exposure to FG-2A composite sediments.

Bioaccumulation assessments using *Macoma* (clam) and Nereis (worm) showed that composite FG-2A produced no significant elevation of any measured contaminant over reference tissue levels.

As discussed in Section 3.1.1 above, the composite sample from Area FG-2B showed chemical contamination, toxicity and bioaccumulation that suggested unsuitability for open water disposal. Based upon the distribution of contaminants within Area FG-2B (as revealed by individual core chemistry data), USEPA (1998a) approved the portion of Area FG-2B represented by sediment cores FG2-7, FG2-9 and FG2-10 for open water disposal. Detailed results, including individual core chemistry data, are presented in KLI/ToxScan, 1997.

Dredge Material Unit FG-3

Thirty sediment cores were collected (two at each of fifteen locations) within area FG-3 and combined into three composite samples FG-3A (5 locations), FG-3B (5 locations) and FG-3C (5 locations). Sampling was performed from mudline to -52' MLLW, and there was no vertical subdivision.

Sediment chemical analysis of the FG-3A, FG-3B and FG-3C composites showed all three composites with copper, mercury, nickel, DDE, total DDTs and total PCBs > ERLs.

Water column bioassays showed that undiluted elutriates of FG-3A and FG-3C composite sediments showed no significantly decreased survival of mussel larvae, but the FG-3B elutriate produced a small but statistically significant decrease in larval survival (LC50 >100%) and LPC limits were not exceeded.. There were no significant deleterious effects of any elutriate to mysids or fish. Benthic bioassay tests showed no significant mortality to amphipods, worms, or mysids after exposure to FG-3A, FG-3B, or FG-3C composite sediments.

Bioaccumulation assessments using *Macoma* (clam) showed that composite FG-3A produced statistically significant elevation of copper, lead, and benzo(b)fluoranthene over LA2 reference tissue levels, and of copper, lead,and DDE over LA3 reference tissue levels. Composite FG-3B produced significant elevations of lead, benzo(a)anthracene, chrysene, and benzo(b)fluoranthene over LA2 reference levels and of lead and total

PAHs over LA3 reference tissues. Composite FG-3C produced elevated lead and DDD over LA2 and elevated lead, DDD and DDE over LA3.

Analysis of *Nereis* (worm) tissue showed no significant bioaccumulation from composite FG-3A, over LA2 reference and significant elevation of only DDE over LA3 reference. From composite FG-3B, DDD, DDE, pyrene and total PAHs were elevated over LA2 reference tissues, and DDD was increased over LA3 reference concentration. Composite FG-3C produced no significant bioaccumulation over LA2 and slightly elevated lead over LA3.

Tissue levels of all significant analytes ranged from 2-4 times reference tissue concentrations, thus were incrementally small. Several were clearly influenced by the arbitrary assignment of numerical values equal to 50% of reporting limits to reference tissues in which an analyte was not detected.

USEPA (1998a) determined that these small increments of tissue contamination over reference levels do not constitute a "substantial" difference, and judged that these FG-3 sediments were suitable for ocean disposal at LA2 or LA3.

Detailed results are presented in KLI/ToxScan, 1997.

Dredge Material Unit FM-1

Twenty sediment cores were collected (two at each of ten locations) within area FM-1 and combined into two composite samples FM-1A (5 locations) and FM-1B (5 locations). Sampling was performed from mudline to -52' MLLW, and there was no vertical subdivision. It was noted that these dredge units consist of fine-grained depositional material overlying consolidated material, identified as formational Malaga Mudstone. Sediment chemistry analysis was done on the FM-1A and FM-1B composites and their component cores, and on samples of Malaga mudstone from cores FM1-2 and FM1-8.

As discussed above in Section 3.1.1, chemical contamination levels, toxicity responses and bioaccumulation results on both FM-1A and FM-1B composites suggested that sediments within dredge unit FM-1 were unsuitable for open water disposal. Supplementary chemical analyses revealed that organic contamination was present exclusively in the depositional sediments overlying the Malaga Mudstone formation material, while the formation material itself contained some elevated levels of metal contaminants. USEPA (1998a) concluded that the overlying depositional sediments in Area FM-1 were not suitable for open water disposal.

A subsequent USEPA memo (USEPA, 1998b) examined individual core chemistry analyses showing that, within Area FM-1A, the concentration of DDT compounds and PCBs is much lower in cores FM1-1 and FM1-3 compared with the other three cores. comprising Area FM-1A. Likewise, the concentration of DDTs and PCBs in cores FM1-8 and FM1-10 is much lower than in the other three cores comprising Area FM-1B. Based on these core chemistry results, USEPA (1998b) concluded that the portion of

Area FM-1A represented by test cores FM1-1 and FM1-3, and the portion of Area FM-1B represented by test cores FM1-8 and FM1-10 are suitable for ocean disposal. Detailed results, including core chemistry data, are presented in KLI/ToxScan, 1997.

USEPA also concluded that the lower layer material underlying the recent depositional layer (Malaga Mudstone) was suitable for ocean disposal (1998a). This determination was made using chemical analyses of the mudstone layer by itself (KLI/ToxScan, 1997). The original tests were done on vertically composited samples that included both the recent depositional sediments and the underlying Malaga Mudstone. Seven metals and PCBs were present in the vertically composited FM-1 and FM-2 samples at somewhat elevated concentrations, and DDTs exceeded ERM values. Of these lead, mercury, and the organics were contributed in part or wholly from the overlying silt layer. Toxicity exceedances were very small as measured on the composite samples with two benthic organisms. Measured bioaccumulation of both copper and mercury were also small (1.5x), and the lead bioaccumulation was small and perhaps a statistical artifact. The conclusion was that organic contamination was present exclusively in the depositional sediments overlying the Malaga Mudstone formation material, while the formation material itself contained some elevated levels of metal contaminants. Other test results available on Malaga Mudstone samples from Fugro borings in the outer harbor showed generally consistent chemical results with those of the Malaga Mudstone from the dredge units of interest. In addition, bioassay tests of the Malaga Mudstone from a nearby station just outside the Main Channel Entrance did not show toxicity (KLI, 1991). Thus, while the formation material underlying the depositional layer of these test areas has somewhat elevated levels of metals, it appears that these are from non-anthropogenic sources, do not cause toxicity, and do not cause significant bioaccumulation. Therefore, it was concluded that this Malaga Mudstone material was suitable for ocean disposal.

3.2 **Southwest Slip Area** (Appendix B-1)

3.2.1 Areas Unsuitable for Ocean Disposal

Area A-1, South Extension of Berth 100

Test data available as part of a separate project for the sediments along the east side of the proposed Southwest Slip terminal area (along the Pier 100 area) where the berths are to be located show that these sediments are suitable for open water disposal (MEC, 2001b).

However, at the very southern end of the new proposed linear berth, an area apparently has not been dredged as part of the previous realignment of the shoreline (corner cut off). Dredging for the dike key is necessary and it is proposed to place this material into the Southwest Slip fill area. Testing of these sediments was done recently (KLI/ToxScan, 2002) at the same time as the Southwest Slip (see discussion below).

Samples taken in the A-1 area showed top layer concentrations of total DDT's and total PCBs that exceeded the ERL guidelines, but no metals exceeded guidelines. The A-1

Bottom layer was clean chemically, with only arsenic exceeding the ERL guidelines. Elutriate chemical analysis showed only copper in the A-1 Bottom elutriate slightly elevated above the USEPA Salt Water maximum criterion with no dilution.

Toxicity was not observed to benthic organisms for the top layer sediments, but the bottom layer showed toxicity to an amphipod test organism. Suspended phase bioassays showed toxicity to mussel larvae which was at least partially due to elevated concentrations of ammonia in A-Top and A-Bottom elutriates. In any case, the toxicity was not enough to exceed the Limiting Permissible Concentration (LPC) for open water disposal or to prevent disposal in a landfill, given expected levels of dilution.

Since these sediments are intended to go to a confined fill area, no further testing was carried out to examine open-water eligibility.

Southwest Slip Dike and Basin Area

Sediments have recently been sampled and tested within the Southwest Slip area (KLI/ToxScan, 2002). Sediment cores were grouped into composite areas B, C, and D moving from east to west back into the Slip (see attached maps, Appendix B-1). Individual core chemistry was done on the cores (two layers, top and bottom except for area D). Further testing of elutriate extracts as well as for suspended phase and benthic phase bioassays was done on the composite samples as appropriate.

Generally, these sediments in the Southwest Slip are fairly heavily contaminated, probably associated with the former shipyard activities as well as the presence of a major storm water discharge channel that empties into the head of the Southwest Slip at the far western end. Most of the cores taken in the Slip had a distinctive smell of hydrocarbon contamination.

Contaminants present were elevated metals that included arsenic, cadmium, chromium, copper, lead, mercury, and nickel. Composite samples showed chromium values ranging from 85-180 mg/kg; copper up to 290 mg/kg (above ERM level); lead 150 to 500 mg/kg (above ERM); and mercury above 6.5 mg/kg (above ERM). Total DDTs in the composites ranged from low values up to 4525 ug/kg (above ERM). Total PCBs range up to 1100 ug/kg and PAHs range from modest values in a few composites up to 68,000 ug/kg for others. Individual core values show high variability but generally are consistent with the results of the composited samples, and thus show individual values greater than the above quoted levels. All levels of chemical contaminants are below Title 22 hazardous waste levels (exception, lead in one core).

Since only relatively small amounts of these Slip bottom samples need to be dredged, just to form the keys for the landfill dikes, large areas of these contaminated sediments will be capped in place in the presently planned landfills for development of the Southwest terminal. Thus the overall effect of this project will be to substantially reduce the amount of contaminated sediments in contact with the Port environment.

More details of the testing results follow below, organized according to the composite areas B, C, and D. See detailed map in Appendix B-1.

Area B - Top and Bottom Samples, Retaining Dike for New Terminal Fill, Opposite GATX

Preliminary observation and odors (petroleum-like) during sampling and sample processing suggested that the level of contamination in cores B5 and B6 was markedly higher than in cores B1 through B4. Accordingly it was decided to prepare the B composite sample using only cores B1 through B4, and to combine cores B5 and B6 into the C composite sample.

For the B-Top Composite, ERL guidance levels were exceeded for arsenic, copper, lead, total DDTs, and total PAHs. ERM levels were exceeded for mercury, DDE, and total PCBs. A benthic bioassay (*Rhepoxynius* vs LA2 reference) showed toxicity, but the difference from the reference site was < 20% so the LPC was not exceeded. Analysis of clams and worms exposed to B-Top Composite sediment showed significant bioaccumulation of DDE, PCBs and PAHs by both species. Several metals also showed elevated tissue concentrations in one or both species. The relatively high levels of important contaminants in the sediment, together with the incidence and extent of bioaccumulation, indicate that B-Top Composite sediment is not suitable for open water disposal.

Elutriate chemistry results showed no exceedance of any water quality criteria. The suspended phase toxicity tests showed no toxicity to water column species. Thus from a water quality perspective of dredging and disposal operations, adverse impacts would not be expected from disposal operations, or from decant water from a confined landfill.

The B-Bottom Composite was judged to be suitable for ocean disposal and is discussed in a section below along with other materials suitable for ocean disposal.

Area C - Top and Bottom Samples, Retaining Dikes for the Proposed New Fill Area.

Note again that the C-composite samples include material from core samples B-5 and B-6 as well as from core samples C-1 through C-9.

For the C-Top Composite, ERL guidance levels were exceeded for arsenic, cadmium, chromium, lead and zinc. ERM guidance levels were exceeded for copper, mercury, nickel, DDE, total DDTs, total PCBs and total PAHs as well as for several individual PAH compounds. The analysis of the individual cores produced data that were consistent with the composite chemistry results. Because of the very extensive chemical contamination, open water disposal was not considered for this sample, and no biological testing was done.

Cabrillo Shallow Water Extension (Figure 1). Data are also summarized for the area of the proposed Pier 400 Submerged Material Storage Site (Figure 1). Dredged material from the channel deepening program that has been determined to be suitable for ocean disposal would be placed in these two outer Harbor sites.

The 1991 environmental study was designed to identify regions within the potential dredge areas that contained high levels of chemical contaminants and/or significant toxicity to sensitive water column and benthic organisms. Of the 24 areas tested, four (Areas 16, 17, 20 and 21) overlapped geographic areas currently proposed for extension of the Cabrillo Shallow Water habitat (Areas 16 & 17) or for the proposed Pier 400 Submerged Materials Storage site (Areas 20 & 21). These original test areas are shown in Appendix C-2.

Three vibracore samples were collected in each Area and combined into three vertical composites as follows. Sediments in the 1-2 foot depth interval were combined into a "top" Area composite; sediments from the 3-5 foot depth interval were combined to form a "mid" Area composite. Sediments from the bottom 2 feet of each core were combined to form a "bottom" Area composite. Each composite was subjected to bulk sediment chemical analysis and to toxicity tests with larvae of the Pacific oyster (*Crassostrea gigas*) and with a benthic amphipod (*Grandidierella japonica*). Results of these sediment evaluations are briefly summarized as follows:

> Sediments from Areas 16 and 17 (in the area of the proposed Cabrillo Shallow Water Habitat Extension) showed exceedences of ERL guidelines for several metals including arsenic, cadmium, chromium, copper, mercury, nickel and silver. The ERM for mercury was exceeded in the Area 16-mid and Area 17-mid and bottom sediments.
>
> Sediment from all four areas showed DDTs in excess of the ERM value. The highest levels were in the top segments of Areas 17, 20 and 21.
>
> Area 16 top and bottom sediments showed benzo(a)pyrene concentrations exceeding the ERL value, but there was overall low PAH contamination in these Areas.
>
> Water column bioassays showed there was no significant decrease in survival or normal development of oyster larvae in elutriates of any of these 12 composites compared with dilution water controls. Likewise, benthic bioassays showed no significantly decreased survival or ability to rebury of amphipods, compared to performance in reference sediment.

These past data over the time period 1991-2001 suggest that sediment quality has not changed markedly over that ten-year interval. Metals and DDT pesticides were and remain somewhat elevated in the region. Sediments in these areas within the footprint of the extended habitat or of the submerged material storage area will be buried by the new materials from the deepening project, including a sand cap for the habitat.

For the C-Bottom Composite, ERL guidance levels were exceeded for arsenic, copper lead, DDE, total DDTs, total PCBs and total PAHs. The ERM level for mercury was also exceeded. A benthic bioassay test using *Ampelisca* showed statistically reduced survival when compared with LA3 reference sediment exposure, but the difference was < 20% and the LPC was not exceeded. Clams and worms were exposed for assessment of bioaccumulation potential, and tissues were frozen. However, these tissues were not analyzed as the design of the proposed Southwest fill was such that these sediments could be accommodated along with other contaminated sediments into this landfill, and segregation of this C-Bottom material was not practical. Therefore, further testing for open water disposal was not necessary.

Elutriate chemistry results showed no exceedance of any water quality criteria. Suspended phase bioassays were run only with the C-Bottom sample, which showed toxicity to mussel larvae; here again, the concentration of ammonia in the elutriate was sufficient to account for much of the observed toxicity. In any case, the toxicity was not enough to exceed the LPC for open water disposal or to prevent disposal in a landfill, given expected levels of dilution.

Area D - The Extension of the Retaining Dike Back into the Slip, Requiring Very Shallow Dredging.

For the Area D composite, only one depth interval was sampled and tested since the dikes planned for this area would have very shallow keys. For the composite sample, ERL levels were exceeded for arsenic, cadmium, chromium, copper, mercury, zinc, and total PAHs. ERM levels were exceeded for lead, DDE, total DDTs, and total PCBs. The total DDT value for the composite was very high, exceeding the ERM by a factor of 100. Individual analyses of the nine cores in area D were consistent with the composite data, including one core with total DDTs exceeding the ERM by 1000x. Because of the very extensive chemical contamination by compounds of extreme ecological concern, open water disposal was not considered and no biological testing was performed on this composite sample.

Clamshell removal for dike key construction and disposal at the bottom of the Southwest landfill has been specified for this material because of the small footprint and precision cuts to be made. Because of the high lead values in the bulk sediment from individual cores in this area, clamshell removal for dike key construction adds an additional safety measure as it suspends the minimum sediment into the water column. These sediments will then be covered by the dike or by the fill later placed in the landfill.

Chemical analysis of standard elutriate prepared from this composite indicated that adverse impacts would not be expected from disposal operations, or from decant water from a confined landfill.

3.2.2 Areas Suitable for Ocean Disposal

Subarea B-Bottom

For the B-Bottom Composite, sediment chemical analysis showed that only the ERL for mercury was exceeded, and elutriate chemistry results showed no exceedance of any water quality criteria.

Bioassay testing showed no toxicity to water column species, but significantly increased mortality was observed in a benthic bioassay (*Rhepoxynius* vs LA2 reference). The difference in survival between B-Bottom and LA2 amphipods was < 20% so the LPC was not exceeded.

Bioaccumulation tissue analyses showed small but statistically significant elevation of only a few metals and of no organic contaminants in clams or worms.

Clean sediment chemistry, no toxicity exceeding LPCs, and little bioaccumulation potential suggest that B-Bottom Composite sediment is suitable for open water disposal. However, because of the difficulties of handling this small amount of bottom material separately in a dredging operation, this bottom material will be disposed along with the contaminated upper layer B-Top in the Southwest Slip fill area.

The lack of chemical and toxicity effects produced by B-Bottom elutriate shows that, from a water quality perspective, adverse impacts would not be expected from disposal operations, or from decant water from a confined landfill.

3.3 Outer Harbor

Recently, six surface grab samples were taken in the Outer Harbor in the area of the proposed extension to the Cabrillo Shallow Underwater Habitat (KLI/ToxScan, 2002). These were designated as Cabrillo Grab samples #1 through #6. Physical, and chemical, data were taken on the individual grab samples and chemical analysis was done on an elutriate prepared from the six-sample sediment composite The results are summarized briefly below and presented in Appendix C-1.

Sediment chemistry data showed that metals and organic contaminants exceeded ERL values (arsenic, cadmium, copper, lead, nickel, zinc, PAHs, and PCBs). Mercury, DDE, and Total DDTs exceeded ERM values. Elutriate chemical analysis showed that Cabrillo Composite elutriate slightly exceeded the USEPA salt water maximum water quality criterion for copper with no dilution. This area will be buried by fill placed within the Cabrillo Shallow Water Habitat Extension.

Previously, sediment data were taken in the Outer Harbor area (KLI, 1991) prior to the design and development of the Pier 400 project. Extensive outer Harbor channel dredging and the Pier 400 fill have been completed since this time in adjacent areas. Appendix C-2 presents a summary of this previous data in the area of the proposed

4.0 SUMMARY OF REUSE/DISPOSAL SUITABILITIES

4.0 SUMMARY OF REUSE/DISPOSAL SUITABILITIES

Based upon criteria in the ocean disposal (USEPA/USACE, 1991) and inland discharge (USEPA/USACE, 1998) testing manuals, potential reuse/disposal options for the sediments involved in the Channel Deepening Project are summarized in Table 1.

This summary table can be used as a guide to further interpretation of the sediment quality data, and for planning sediment management that must include the materials both suitable and unsuitable for ocean disposal.

Table 1. Dredge Sediment Properties: Port of Los Angeles - Channel Deepening Project.

Dredge Material Unit	Reference	Depth Intervals Elevations	Material Properties			Environmental						Comments
			Composite Grain Size[1]			Unconfined Aquatic			Fill	Upland		
			% Sand	% Silt	% Clay	LA2	LA3	In Bay	CAD	Class 1	Class 2,3	
CG-1	KLI, 1996	-46 to -60	79-93	5-14	2-7	Yes	Yes	Yes	Yes	NA	Yes	DDE and DDTs > ERL
CG 2	KLI, 1997a	'-44.5 to -65	80-90	4-11	1-9	Yes	Yes	Yes	Yes	NA	Yes	Cu, Hg, PCBs > ERL; DDT & DDE > ERM
CG 3	KLI, 1997a	-43.2 to -65	56 - 91	5 - 25	3 - 19	Yes	Yes	Yes	Yes	NA	Yes	Cu, Hg, Ni, PAH, HPAH & DDT > ERL; DDE & PCBs > ERM
CG 4	KLI, 1997a	-42.5 to -65	78 - 91	6 - 15	3 - 9	Yes	Yes	Yes	Yes	NA	Yes	Hg,Ni, DDE, DDT & PCBs > ERL
FG 1	KLI, 1997a	-45 to -52	37 - 49	30 - 35	21 - 25	Yes	Yes	Yes	Yes	NA	Yes	Cu, Hg, Ni, DDTs & PCBs > ERL; DDEs > ERM
FG 2	KLI, 1997a	-46.1 to -52	29* - 56	28 - 43*	16 - 28*	Yes	Yes	Yes	Yes	NA	Yes	Cu, Hg, Ni, DDE, DDT & PCBs > ERL
FG 2-B (2-6 and 2-8)	KLI, 1997a	-44.3 to -52*	45*	35*	10*	No	No	No	Yes	NA	Yes	Hg, Ni, DDE & DDT > ERL; PCBs > ERM (all values*)
FG 3	KLI, 1997a	-44.2 to -52	31- 38	42 - 48	19 - 21	Yes	Yes	Yes	Yes	NA	Yes	Cu, Pb, Hg & Ni > ERL; DDE, DDT & PCBs > ERM
FM 1 (A 1-1, 1-3 & B 1-8, 1-10)	KLI, 1997a	-47.3 to -52*	11* - 46*	30* - 50*	25* - 39*	Yes	Yes	Yes	Yes	NA	Yes	Cd, Cr, Cu, Zn, DDE, DDT & PCBs > ERL; Ni > ERM (all values*)
FM 1(A 1-2, 1-4, 1-5 & B 1-6, 1-7, 1-9)	KLI, 1997a	-42.4 to -52*	16* - 18*	44* - 50*	37* - 38*	No	No	No	Yes	NA	Yes	Cd, Cr, Cu, Hg, Pb & Zn > ERL; Ni, DDE, DDT & PCBs (all values*)
FG 2-6 & 2-8	MEC, 2001	-52 to -55	78	16	6	No	No	No	Yes	NA	Yes	PCBs > ERL
Pilot Station	MEC, 2001	to -37	69-74	18-24	6.8-7.4	Yes	Yes	Yes	Yes	NA	Yes	Cu, DDE, DDT & PCBs > ERL
SWS A1-Top	KLI, 2001	-44.8 to -50.3	67	21	12.5	No[2]	No[2]	No[2]	Yes	NA	Yes	DDTs and PCBs > ERL
SWS A1-Bottom	KLI, 2001	-50.3 to -61.0	16	55	31	No[2]	No[2]	No[2]	Yes	NA	Yes	Rhepoxynius toxicity > LPC; As > ERL
SWS B-Top	KLI, 2001	-32.3 to - 48.0	49	31	20	No	No	No	Yes	NA	Yes	As, Cu, Pb, DDTs, PAHs > ERL; PCBs = ERM
SWS B-Bottom	KLI, 2001	-37.3 to - 55.0	40	38	22	Yes	Yes	Yes	Yes	NA	Yes	All OK
SWS C-Top	KLI, 2001	-19.8 to - 48.5	37	35	27	No[2]	No[2]	No[2]	Yes	NA	Yes	As, Cd, Cr, Pb, Zn > ERL; Cu, Hg, Ni, DDTs, PCBs, PAHs > ERM
SWS C-Bottom	KLI, 2001	-27.2 to -54.5	21	52	27	No[2]	No[2]	No[2]	Yes	NA	Yes	As, Cu, Pb, DDTs, PCBs, PAHs > ERL; Hg > ERM
SWS D	KLI, 2001	-1.25 to - 54.75	44	34	22	No[2]	No[2]	No[2]	Yes	Yes	Yes	As, Cd, Cu, Hg, Ni, Zn, PAHs >ERL; DDTs, PCBs, Pb > ERM

[1] Percentages listed are a range from all subareas and vertical strata associated with the main dredge unit.

[2] Testing for open water eligibility not done

* Mathematical composite

Revision Date: 19 Jan 02
Revised By: ST

5.0 REFERENCES CITED

5.0 REFERENCES CITED

KLI (Kinnetic Laboratories, Inc.). 1991. POLA 2020 Plan Geotechnical Investigation, Environmental Tasks. Prepared for the Port of Los Angeles, San Pedro, CA.

KLI/ToxScan (Kinnetic Laboratories/ToxScan, Inc.). 1996. Chemical Analysis and Toxicity Evaluation of Sediments, Pier 400 Deep Navigation Project Borrow Project. Prepared for Port of Los Angeles, San Pedro, CA.

_____. 1997. Environmental Evaluation of Sediments for the Channel Deepening Program, Port of Los Angeles. Prepared for Fugro West, Inc., Ventura, CA. and Los Angeles Harbor Department, San Pedro, CA.

_____. 2002. Dredged Material Sampling and Analysis, Southwest Basin Development Project, Port of Los Angeles. Prepared for Port of Los Angeles, San Pedro, CA.

Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995. Incidence of Adverse Biological effects Within the Ranges of Chemical concentrations in Marine and Estuarine Sediments. Environmental Management, Vol. 19: 81-97.

MEC (MEC Analytical Systems, Inc.). 2001a. Results of Physical, Chemical, and Bioassay Testing of Sediments Collected for the Port of Los Angeles Modified Channel Deepening Program. Prepared for the Port of Los Angeles, Environmental Management Division, San Pedro, CA.

_____. 2001b. Berth 100 Wharf Construction and shoreline Improvement - Sediment Characterization Study, Port of Los Angeles Final Report. Prepared for the Port of Los Angeles, Environmental Management Division, San Pedro, CA.

USACE (U.S. Army Corps of Engineers, Los Angeles District). 2000. Port of Los Angeles Channel Deepening Project. Feasibility Study, Main Report and Appendices. November. State Clearinghouse No 99091209. ADP No. 990809-102.

USEPA (U.S. Environmental Protection Agency). 1998a. Memorandum: Port of Los Angeles, Channel Deepening Program (Main Channel). From Steve John, U. S. Environmental Protection Agency, Region IX. May 1, 1998.

_____. 1998b. Memorandum: Port of Los Angeles, Channel Deepening Program (Main Channel). From Steve John, U. S. Environmental Protection Agency, Region IX. May 14, 1998 (Amendment).

USEPA/USACE (U.S. Environmental Protection Agency/ U.S. Army Corps of Engineers). 1991. Evaluation of Dredged Material Proposed for Ocean Disposal (Testing Manual), USEPA Office of Marine and Estuaries Protection, and Department of the Army, USACE. Washington D.C. USEPA-503/8-91/001.

_____. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual. USEPA-823-B-98-004.

APPENDIX A

INNER HARBOR CHANNELS

APPENDIX A-1

CHEMICAL ANALYSIS AND TOXICITY EVALUATION OF SEDIMENTS, PIER 400 DEEP NAVIGATION PROJECT BORROW PROJECT (Kinnetic Laboratories/ToxScan, 1996)

ENVIRONMENTAL EVALUATION OF SEDIMENTS FOR THE CHANNEL DEEPENING PROGRAM, PORT OF LOS ANGELES (Kinnetic Laboratories/ToxScan, 1997)

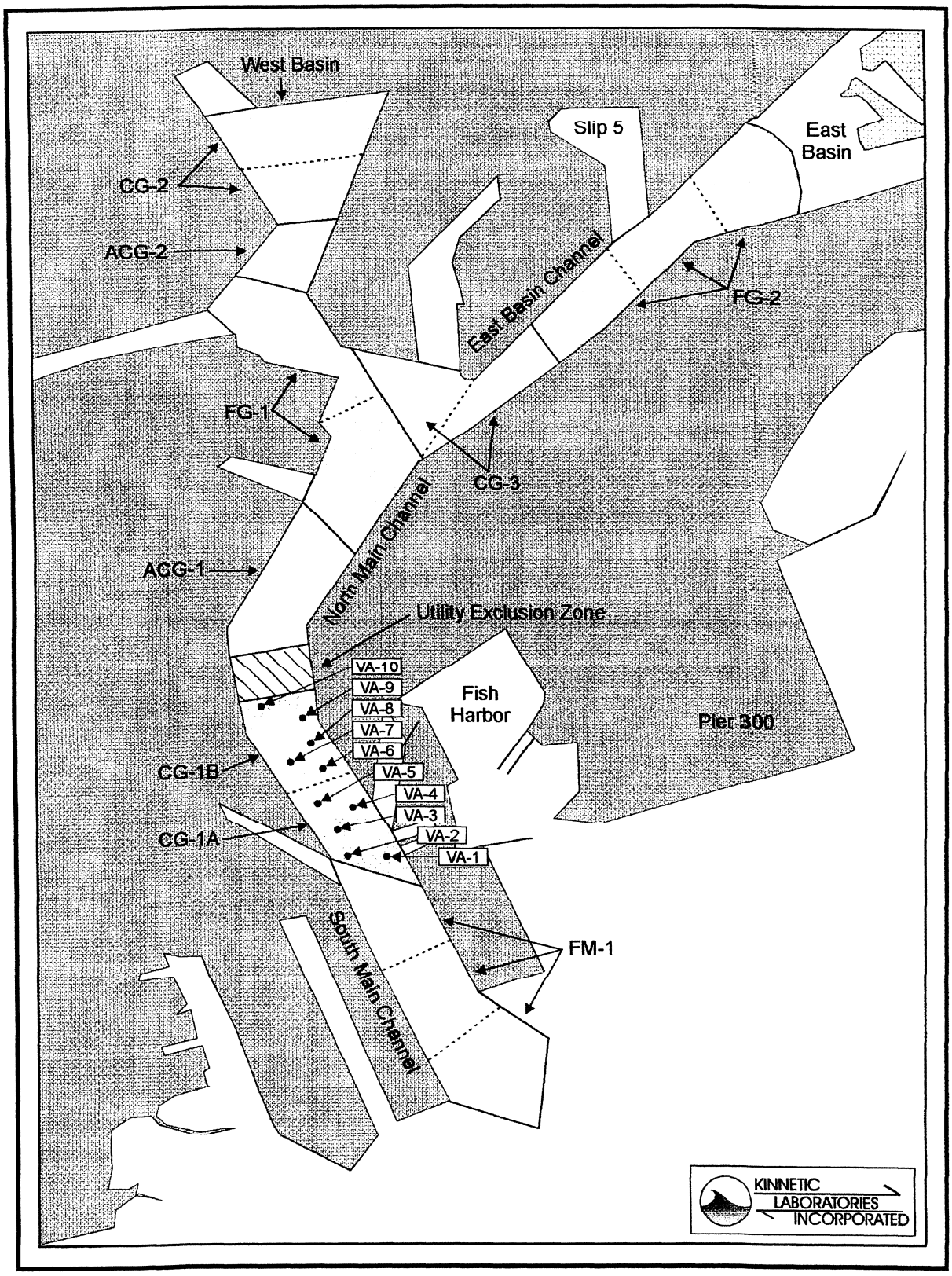


Figure 1. Vibracore Locations for the Port of Los Angeles, Pier 400 Borrow Project.

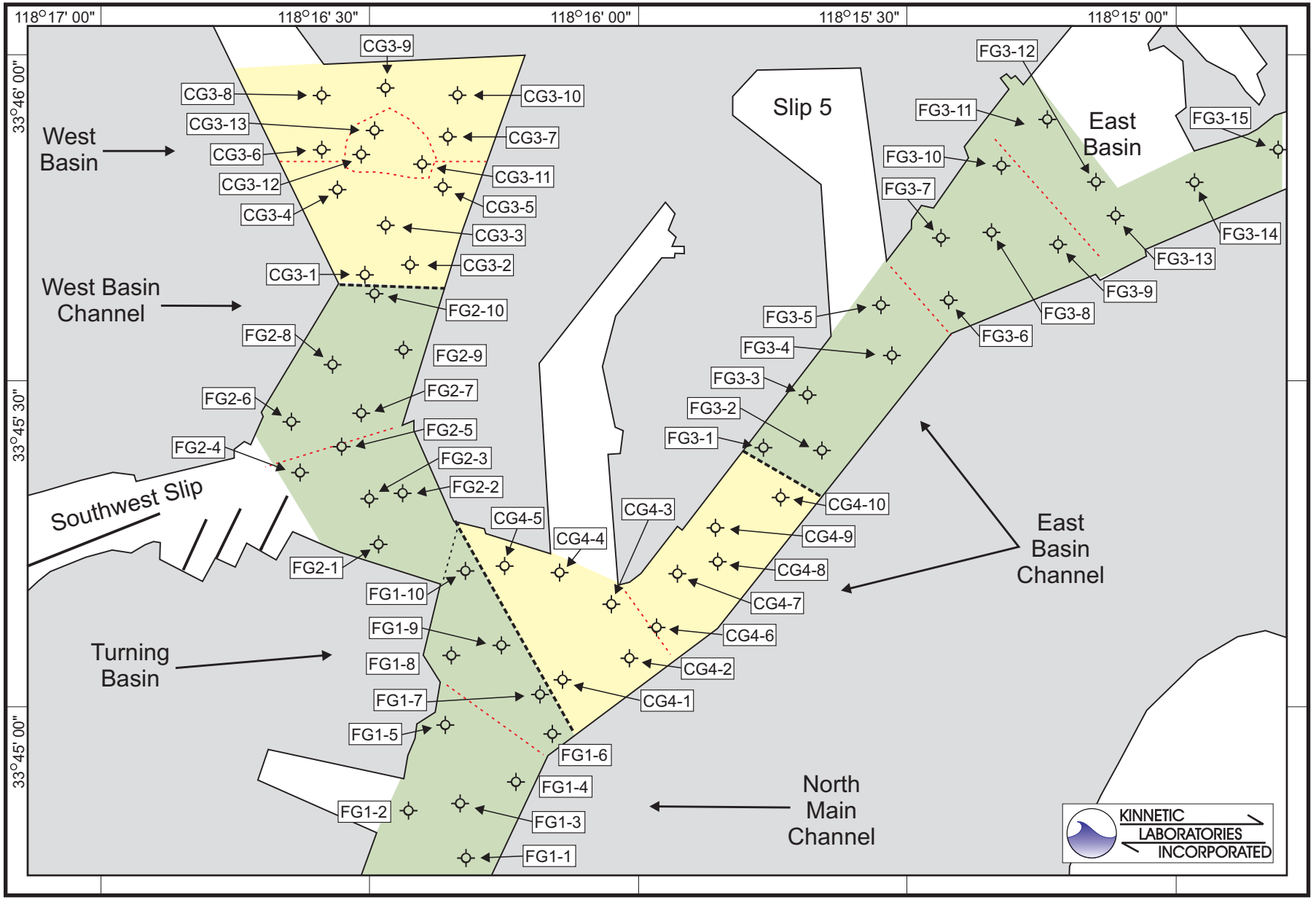


Figure 2. Vibracore Sampling Locations for the Port of Los Angeles Channel Deepening Program (Northern Extent of the Inner Harbor), April 1997.

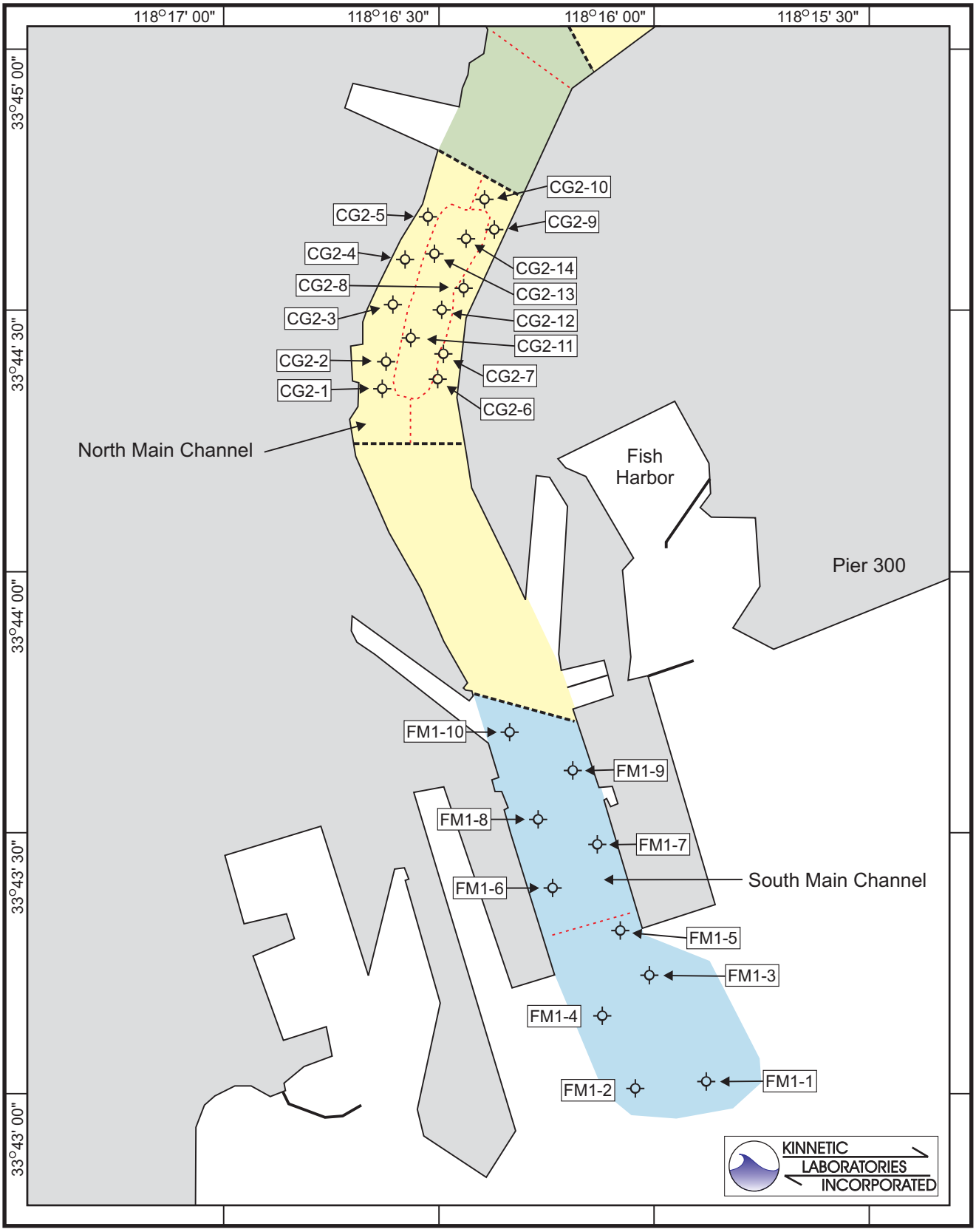


Figure 3. Vibracore Sampling Locations for the Port of Los Angeles Channel Deepening Program (Southern Extent of the Inner Harbor), April 1997.

Table 1. Core Locations: Borrow - 1996 / Channel Deepening - 1997(Kinnetic Laboratories/ToxScan 1996; 1997)

BORROW - 1996 / CHANNEL DEEPENING - 1997

Core ID	Latitude (NAD 83)	Longitude (NAD 83)	Seafloor Elevation (feet MLLW)	Length Recovered (feet)	Sampling Interval (feet)	Sampling Interval (feet MLLW)
BORROW - 1996						
Subunit CG-1A						
VA-1	33° 43.7460'	118° 16.3290'	-46.9	8.0	0.0 to 5.1	-46.9 to -52.0
					5.1-7.0	-52.0 to -54.9
VA-2	33° 43.7610'	118° 16.3686'	-47.6	17.5	0.0 to 4.5	-47.6 to -52.0
					4.5 to 12.5	-52.0 to -60.0
VA-3	33° 43.8431'	118° 16.4202'	-48.0	12.0	0.0 to 4.0	-48.0 to -52.0
					4.0 to 12.0	-52.0 to -60.0
VA-4	33° 43.9212'	118° 16.3841'	-48.0	15.5	0.0 to 4.0	-48.0 to -52.0
					4.0 to 12.0	-52.0 to -60.0
VA-5	33° 43.9373'	118° 16.4913'	-45.5	15.0	0.0 to 6.5	-45.5 to -52.0
					6.5 to 14.5	-52.0 to -60.0
Subunit CG-1B						
VA-6	33° 44.0400'	118° 16.4664'	-47.0	17.5	0.0 to 5.0	-47.0 to -52.0
					5.0 to 13.0	-52.0 to -60.0
VA-7	33° 44.0624'	118° 16.5488'	-47.4	19.0	0.0 to 4.6	-47.4 to -52.0
					4.6 to 12.6	-52.0 to -60.0
VA-8	33° 44.1175'	118° 16.4703'	-46.25	18.5	0.0 to 5.75	-46.25 to -52.0
					5.75 to 13.75	-52.0 to -60.0
VA-9	33° 44.2227'	118° 16.5369'	-48.0	18.0	0.0 to 4.0	-48.0 to -52.0
					4.0 to 12.0	-52.0 to -60.0
VA-10	33° 44.2764'	118° 16.6297'	-46.8	19.0	0.0 to 5.2	-46.8 to -52.0
					5.2 to 13.2	-52.0 to -60.0
CHANNEL DEEPENING - 1997						
Subunit CG-2A						
CG2-1	33° 44.3508'	118° 16.6442'	-45.7	18.7	0.0 to 6.3	-45.7 to -52
					6.3 to 18.7	-52 to -64.4
CG2-2	33° 44.4030'	118° 16.6361'	-46.2	19.6	0.0 to 5.8	-46.2 to -52
					5.8 to 18.8	-52 to -65
CG2-3	33° 44.5104'	118° 16.6193'	-44.5	18.2	0.0 to 7.5	-44.5 to -52
					7.5 to 18.2	-52 to -62.7
CG2-4	33° 44.5972'	118° 16.5918'	-45.2	20	0.0 to 6.8	-45.2 to -52
					6.8 to 19.8	-52 to -65
CG2-5	33° 44.6808'	118° 16.5379'	-45.2	19	0.0 to 6.8	-45.2 to -52
					6.8 to 19.0	-52 to -64.2
Subunit CG-2B						
CG2-6	33° 44.3684'	118° 16.5192'	-50.4	14.8	0.0 to 1.6	-50.4 to -52
					1.6 to 14.6	-52 to -65
CG2-7	33° 44.4161'	118° 16.5096'	-44.3	18.5	0.0 to 7.7	-44.3 to -52
					7.7 to 18.5	-52 to -62.8
CG2-8	33° 44.5438'	118° 16.4553'	-50.0	19.7	0.0 to 2.0	-50.0 to -52
					2.0 to 15.0	-52 to -65
CG2-9	33° 44.6554'	118° 16.3842'	-49.1	15.5	0.0 to 2.9	-49.1 to -52
					2.9 to 15.5	-52 to -64.6
CG2-10	33° 44.7131'	118° 16.4063'	-49.7	19.2	0.0 to 2.3	-49.7 to -52

Table 1. Core Locations: Borrow - 1996 / Channel Deepening - 1997(Kinnetic Laboratories/ToxScan 1996; 1997)

	BORROW - 1996 / CHANNEL DEEPENING - 1997					
Core ID	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Seafloor Elevation (feet MLLW)**	**Length Recovered (feet)**	**Sampling Interval (feet)**	**Sampling Interval (feet MLLW)**
					2.3 to 15.3	-52 to -65
Subunit CG-2C						
CG2-11	33° 44.4475'	118° 16.5798'	-57.7	19.8	0.0 to 7.3	-57.7 to -65
CG2-12	33° 44.5017'	118° 16.5059'	-55.8	19	0.0 to 9.2	-55.8 to -65
CG2-13	33° 44.6102'	118° 16.5235'	-56.1	18.5	0.0 to 8.9	-56.1 to -65
CG2-14	33° 44.6385'	118° 16.4499'	-56.1	16.5	0.0 to 8.9	-56.1 to -65
Subunit CG-3A						
CG3-1	33° 45.6627'	118° 16.5083'	-49.2	17.8	0.0 to 2.8	-49.2 to -52
					2.8 to 15.8	-52 to -65
CG3-2	33° 45.6771'	118° 16.4249'	-44.2	19.8	0.0 to 7.8	-44.2 to -52
					7.8 to 19.8	-52 to -64
CG3-3	33° 45.7385'	118° 16.4699'	-47.9	19.5	0.0 to 4.1	-47.9 to -52
					4.1 to 17.1	-52 to -65
CG3-4	33° 45.7934'	118° 16.5609'	-47.2	11.2	0.0 to 4.8	-47.2 to -52
					4.8 to 11.2	-52 to -58.4
CG3-5	33° 45.7961'	118° 16.3649'	-43.2	19.7	0.0 to 8.8	-43.2 to -52
					8.8 to 19.7	-52 to -62.9
Subunit CG-3B						
CG3-6	33° 45.8536'	118° 16.5894'	-47.7	18	0.0 to 4.3	-47.7 to -52
					4.3 to 17.3	-52 to -65
CG3-7	33° 45.8739'	118° 16.3545'	-44.1	15	0.0 to 7.9	-44.1 to -52
					7.9 to 15	-52 to -59.1
CG3-8	33° 45.9386'	118° 16.5896'	-41.4	16	0.0 to 10.6	-41.4 to -52
					10.6 to 16	-52 to 57.4
CG3-9	33° 45.9482'	118° 16.4702'	-44.5	17.7	0.0 to 7.5	-44.5 to -52
					7.5 to 17.7	-52 to -62.2
CG3-10	33° 45.9377'	118° 16.3357	-44.3	20	0.0 to 7.7	-44.3 to -52
					7.7 to 20	-52 to -64.3
Subunit CG-3C						
CG3-11	33° 45.8314'	118° 16.4015'	-59.0	12.2	0.0 to 6.0	-59.0 to -65
CG3-12	33° 45.8472'	118° 16.5153'	-51.0	17.5	0.0 to 14.0	-51.0 to -65
CG3-13	33° 45.8835'	118° 16.4907'	-50.8	19.5	0.0 to 14.2	-50.8 to -65
Subunit CG-4A						
CG4-1	33° 45.0293'	118° 16.1724'	-47.2	19.7	0.0 to 4.8	-47.2 to -52
					4.8 to 17.8	-52 to -65
CG4-2	33° 45.0620'	118° 16.0479'	-46.6	18	0.0 to 5.4	-46.6 to -52
					5.4 to 18	-52 to -64.6
CG4-3	33° 45.1455'	118° 16.0824'	-44.0	20	0.0 to 8.0	-44.0 to -52
					8.0 to 20.0	-52 to -64
CG4-4	33° 45.1930'	118° 16.1778'	-43.2	20	0.0 to 8.8	-43.2 to -52
					8.8 to 20.0	-52 to -63.2
CG4-5	33° 45.2028'	118° 16.2806'	-42.5	20	0.0 to 9.5	-42.5 to -52
					9.5 to 20	-52 to -62.5
Subunit CG-4B						
CG4-6	33° 45.1078'	118° 16.0057'	-45.1	19.5	0.0 to 6.9	-45.1 to -52

Table 1. Core Locations: Borrow - 1996 / Channel Deepening - 1997(Kinnetic Laboratories/ToxScan 1996; 1997)

BORROW - 1996 / CHANNEL DEEPENING - 1997

Core ID	Latitude (NAD 83)	Longitude (NAD 83)	Seafloor Elevation (feet MLLW)	Length Recovered (feet)	Sampling Interval (feet)	Sampling Interval (feet MLLW)
					6.9 to 19.5	-52 to -64.6
CG4-7	33° 45.1921'	118° 15.9594'	-46.8	18	0.0 to 5.2	-46.8 to -52
					5.2 to 18.0	-52 to -64.8
CG4-8	33° 45.2093'	118° 15.8839'	-44.0	19	0.0 to 8.0	-44.0 to -52
					8.0 to 19.0	-52 to -63
CG4-9	33° 45.2615'	118° 15.8870'	-45.5	20	0.0 to 6.5	-45.5 to -52
					6.5 to 19.5	-52 to -65
CG4-10	33° 45.3080'	118° 15.7665'	-45.3	18	0.0 to 6.7	-45.3 to -52
					6.7 to 18	-52 to -63.3
Subunit FG1-A						
FG1-1 (1)	33° 44.7422'	118° 16.3536'	-47.7	6	0.0 to 4.3	-47.7 to -52
FG1-1 (2)	33° 44.7444'	118° 16.3584'	-47.7	5.1	0.0 to 4.3	-47.7 to -52
FG1-2 (1)	33° 44.8277'	118° 16.4590'	-49.1	3.4	0.0 to 2.9	-49.1 to -52
FG1-2 (2)	33° 44.8274'	118° 16.4585'	-49.0	3.7	0.0 to 3.0	-49.0 to -52
FG1-3 (1)	33° 44.8426'	118° 16.3633'	-49.4	4.4	0.0 to 2.6	-49.4 to -52
FG1-3 (2)	33° 44.8399'	118° 16.3625'	-49.4	4.7	0.0 to 2.6	-49.4 to -52
FG1-4 (1)	33° 44.8731'	118° 16.2577'	-46.8	6.2	0.0 to 5.2	-46.8 to -52
FG1-4 (2)	33° 44.8722'	118° 16.2578'	-46.9	6.9	0.0 to 5.1	-46.9 to -52
FG1-5 (1)	33° 44.9594'	118° 16.3909'	-45.1	9.2	0.0 to 6.9	-45.1 to -52
FG1-5 (2)	33° 44.9600'	118° 16.3904'	-45.0	7.9	0.0 to 7.0	-45.0 to -52
Subunit FG1-B						
FG1-6 (1)	33° 44.9452'	118° 16.1918'	-45.8	8	0.0 to 6.2	-45.8 to -52
FG1-6 (2)	33° 44.9447'	118° 16.1926'	-45.8	7.7	0.0 to 6.2	-45.8 to -52
FG1-7 (1)	33° 45.0065'	118° 16.2155'	-48.7	3.7	0.0 to 3.3	-48.7 to -52
FG1-7 (2)	33° 45.0056'	118° 16.2148'	-48.8	4	0.0 to 3.2	-48.8 to -52
FG1-8 (1)	33° 45.0664'	118° 16.3804'	-45.7	10.1	0.0 to 6.3	-45.7 to -52
FG1-8 (2)	33° 45.0662'	118° 16.3804'	-45.4	7.5	0.0 to 6.6	-45.4 to -52
FG1-9 (1)	33° 45.0822'	118° 16.2861'	-49.3	3.5	0.0 to 2.7	-49.3 to -52
FG1-9 (2)	33° 45.0830'	118° 16.2867'	-49.4	2.5	0.0 to 2.6	-49.4 to -52
FG1-10 (1)	33° 45.1956'	118° 16.3529'	-50.2	2.5	0.0 to 1.7	-50.2 to -51.9
FG1-10 (2)	33° 45.1957'	118° 16.3535'	-50.3	2.4	0.0 to 1.7	-50.3 to -52
Subunit FG2-A						
FG2-1 (1)	33° 45.2493'	118° 16.4835'	-47.6	6.7	0.0 to 4.4	-47.6 to -52
FG2-1 (2)	33° 45.2480'	118° 16.4833'	-47.5	5.5	0.0 to 4.5	-47.5 to -52
FG2-2 (1)	33° 45.3268'	118° 16.4387'	-47.3	6.7	0.0 to 4.7	-47.3 to -52
FG2-2 (2)	33° 45.3199'	118° 16.4329'	-47.1	6.1	0.0 to 4.9	-47.1 to -52
FG2-3 (1)	33° 45.3187'	118° 16.4989'	-49.6	2.5	0.0 to 2.4	-49.6 to -52
FG2-3 (2)	33° 45.3190'	118° 16.4995'	-49.5	3	0.0 to 2.5	-49.5 to -52
FG2-4 (1)	33° 45.3609'	118° 16.6276'	-46.4	4.7	0.0 to 4.7	-46.4 to -51.1
FG2-4 (2)	33° 45.3592'	118° 16.6294'	-46.4	4.5	0.0 to 4.5	-46.4 to -50.9
FG2-5 (1)	33° 45.3994'	118° 16.5518'	-48.6	4.5	0.0 to 3.4	-48.6 to -52
FG2-5 (2)	33° 45.4012'	118° 16.5525'	-48.7	4	0.0 to 3.3	-48.7 to -52
Subunit FG2-B						
FG2-6 (1)	33° 45.4369'	118° 16.6454'	-44.8	8.5	0.0 to 7.2	-44.8 to -52
FG2-6 (2)	33° 45.4349'	118° 16.6378'	-44.3	7.2	0.0 to 7.2	-44.3 to -51.5

Table 1. Core Locations: Borrow - 1996 / Channel Deepening - 1997(Kinnetic Laboratories/ToxScan 1996; 1997)

BORROW - 1996 / CHANNEL DEEPENING - 1997

Core ID	Latitude (NAD 83)	Longitude (NAD 83)	Seafloor Elevation (feet MLLW)	Length Recovered (feet)	Sampling Interval (feet)	Sampling Interval (feet MLLW)
FG2-7 (1)	33° 45.4501'	118° 16.5156'	-46.6	6	0.0 to 5.4	-46.6 to -52
FG2-7 (2)	33° 45.4503'	118° 16.5160'	-47.0	5.2	0.0 to 5.0	-47.0 to -52
FG2-8 (1)	33° 45.5232'	118° 16.5721'	-47.5	2.5	0.0 to 2.5	-47.5 to -50
FG2-8 (2)	33° 45.5248'	118° 16.5694'	-47.2	3	0.0 to 3.0	-47.2 to -50.2
FG2-9 (1)	33° 45.5470'	118° 16.4370'	-47.8	4.0	0.0 to 4.0	-47.8 to -51.8
FG2-9 (2)	33° 45.5470'	118° 16.4370'	-47.6	6.5	0.0 to 4.4	-47.6 to -52
FG2-10 (1)	33° 45.6334'	118° 16.4909'	-49.7	6	0.0 to 2.3	-49.7 to -52
FG2-10 (2)	33° 45.6326'	118° 16.4915'	-49.8	5.2	0.0 to 2.2	-49.8 to -52
Subunit FG3-A						
FG3-1 (1)	33° 45.3911'	118° 15.7898'	-47.3	6.5	0.0 to 4.7	-47.3 to -52
FG3-1 (2)	33° 45.3922'	118° 15.7897'	-47.4	6.4	0.0 to 4.6	-47.4 to -52
FG3-2 (1)	33° 45.3792'	118° 15.6896'	-46.7	6.1	0.0 to 5.3	-46.7 to -52
FG3-2 (2)	33° 45.3796'	118° 15.6902'	-46.9	6.1	0.0 to 5.1	-46.9 to -52
FG3-3 (1)	33° 45.4635'	118° 15.7114'	-47.6	6.5	0.0 to 4.4	-47.6 to -52
FG3-3 (2)	33° 45.4645'	118° 15.7170'	-47.6	6.5	0.0 to 4.4	-47.6 to -52
FG3-4 (1)	33° 45.5270'	118° 15.5592'	-46.9	7	0.0 to 5.1	-46.9 to -52
FG3-4 (2)	33° 45.5289'	118° 15.5571'	-46.8	6.1	0.0 to 5.2	-46.8 to -52
FG3-5 (1)	33° 45.6033'	118° 15.5800'	-49.3	4	0.0 to 2.7	-49.3 to -52
FG3-5 (2)	33° 45.6046'	118° 15.5806'	-49.3	3.2	0.0 to 2.7	-49.3 to -52
Subunit FG3-B						
FG3-6 (1)	33° 45.6107'	118° 15.4536'	-47.0	7.4	0.0 to 5.0	-47.0 to -52
FG3-6 (2)	33° 45.6100'	118° 15.4547'	-47.0	7.4	0.0 to 5.0	-47.0 to -52
FG3-7 (1)	33° 45.7071'	118° 15.4683'	-44.2	10.2	0.0 to 7.8	-44.2 to -52
FG3-7 (2)	33° 45.7070'	118° 15.4680'	-44.2	9.2	0.0 to 7.8	-44.2 to -52
FG3-8 (1)	33° 45.7149'	118° 15.3747'	-47.5	6.5	0.0 to 4.5	-47.5 to -52
FG3-8 (2)	33° 45.7155'	118° 15.3750'	-47.5	6	0.0 to 4.5	-47.5 to -52
FG3-9 (1)	33° 45.6954'	118° 15.2510'	-47.6	6.9	0.0 to 4.4	-47.6 to -52
FG3-9 (2)	33° 45.6958'	118° 15.2509'	-47.4	6.7	0.0 to 4.6	-47.4 to -52
FG3-10 (1)	33° 45.8166'	118° 15.3581'	-47.4	6.2	0.0 to 4.6	-47.4 to -52
FG3-10 (2)	33° 45.8169'	118° 15.3565'	-47.3	7	0.0 to 4.7	-47.3 to -52
Subunit FG3-C						
FG3-11 (1)	33° 45.8912'	118° 15.2723'	-45.0	7.5	0.0 to 7.0	-45.0 to -52
FG3-11 (2)	33° 45.8905'	118° 15.2719'	-44.9	7	0.0 to 7.0	-44.9 to -51.9
FG3-12 (1)	33° 45.7924'	118° 15.1798'	-46.0	7.2	0.0 to 6.0	-46.0 to -52
FG3-12 (2)	33° 45.7916'	118° 15.1798'	-46.0	7.7	0.0 to 6.0	-46.0 to -52
FG3-13 (1)	33° 45.7405'	118° 15.1432'	-47.3	7	0.0 to 4.7	-47.3 to -52
FG3-13 (2)	33° 45.7402'	118° 15.1446'	-47.3	7.5	0.0 to 4.7	-47.3 to -52
FG3-14 (1)	33° 45.7904'	118° 14.9980'	-46.3	5.5	0.0 to 5.5	-46.3 to -51.8
FG3-14 (2)	33° 45.7915'	118° 14.9980'	-46.6	6.2	0.0 to 5.4	-46.6 to -52
FG3-15 (1)	33° 45.8420'	118° 14.8410'	-46.6	7.2	0.0 to 5.4	-46.6 to -52
FG3-15 (2)	33° 45.8423'	118° 14.8407'	-46.5	7.2	0.0 to 5.5	-46.5 to -52
Subunit FM1-A						
FM1-1 ALT (1)	33° 43.0214'	118° 15.9161'	-48.9	2.4	0.0 to 2.4	-48.9 to -51.3
FM1-1 ALT (2)	33° 43.0217'	118° 15.9185'	-49.2	2.2	0.0 to 2.2	-49.2 to -51.4
FM1-2 (1)	33° 43.0060'	118° 16.0819'	-45.0	4	0.0 to 4.0	-45.0 to -49.0

Table 1. Core Locations: Borrow - 1996 / Channel Deepening - 1997(Kinnetic Laboratories/ToxScan 1996; 1997)

	BORROW - 1996 / CHANNEL DEEPENING - 1997					
Core ID	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Seafloor Elevation (feet MLLW)**	**Length Recovered (feet)**	**Sampling Interval (feet)**	**Sampling Interval (feet MLLW)**
FM1-2 (2)	33° 43.0072'	118° 16.0821'	-45.2	5	0.0 to 5.0	-45.2 to -50.2
FM1-3 ALT (1)	33° 43.2290'	118° 16.0487'	-47.3	5.2	0.0 to 4.7	-47.3 to -52
FM1-3 ALT (2)	33° 43.2264'	118° 16.0500'	-48.3	3.7	0.0 to 3.7	-48.3 to -52
FM1-4 (1)	33° 43.1425'	118° 16.1570'	-44.2	9.5	0.0 to 7.8	-44.2 to -52
FM1-4 (2)	33° 43.1477'	118° 16.1592'	-44.2	9	0.0 to 7.8	-44.2 to -52
FM1-5 (1)	33° 43.3133'	118° 16.1167'	-47.5	2.8	0.0 to 2.8	-47.5 to -50.3
FM1-5 (2)	33° 43.3116'	118° 16.1167'	-47.8	4.5	0.0 to 4.2	-47.8 to -52
Subunit FM1-B						
FM1-6 (1)	33° 43.3933'	118° 16.2750'	-45.8	5.9	0.0 to 5.9	-45.8 to -51.7
FM1-6 (2)	33° 43.3933'	118° 16.2750'	-45.8	7	0.0 to 6.2	-45.8 to -52
FM1-7 (1)	33° 43.4783'	118° 16.1700'	-42.4	4.5	0.0 to 4.5	-42.4 to -46.9
FM1-7 (2)	33° 43.4820'	118° 16.1660'	-42.5	4.1	0.0 to 4.1	-42.5 to -46.6
FM1-8 (1)	33° 43.5324'	118° 16.3113'	-48.4	3	0.0 to 3.0	-48.4 to -51.4
FM1-8 (2)	33° 43.5291'	118° 16.3091'	-48.5	3	0.0 to 3.0	-48.5 to -51.5
FM1-9 (1)	33° 43.6169'	118° 16.2295'	-44.7	7	0.0 to 7.0	-44.7 to -51.7
FM1-9 (2)	33° 43.6188'	118° 16.2292'	-45.0	8.5	0.0 to 7.0	-45.0 to -52
FM1-10 (1)	33° 43.6922'	118° 16.3746'	-47.8	6	0.0 to 4.2	-47.8 to -52
FM1-10 (2)	33° 43.6927'	118° 16.3746'	-47.9	6.2	0.0 to 4.1	-47.9 to -52

Table 2. Bulk Sediment Chemistry Results: Borrow - 1996 / Channel Deepening - 1997 (Kinnetic Laboratories/ToxScan 1996; 1997). (page 1 of 2)

	BORROW 1996				CHANNEL DEEPENING PROJECT 1997*																						
Analytical Parameter	CG-1A TOP	CG-1A BOT	CB-1B TOP	CG-1B BOT	CG-2A TOP	CG-2A BOT	CG-2B TOP	CG-2B BOT	CG-2C BOT	CG-3A TOP	CG-3A BOT	CG-3B TOP	CG-3B BOT	CG-3C BOT	CG-4A TOP	CG-4A BOT	CG-4B TOP	CG-4B BOT	FG1A	FG1B	FG2A	FG2B	FG3A	FG3B	FG3C	FM1A	FM1B	FM1-2	FM1-8
GRAIN SIZE (% dry)																													
Sand/Gravel (>0.063 mm)	78.7	92.9	90.1	82.7	80.3	95.4	82.4	88.3	90.4	56.3	79.8	76.8	90.6	90.8	78.3	81.3	90.6	77.8	36.9	48.6	55.5	40.7	30.5	38.0	33.7	23.1	50.1	36.8	46.4
Silt (0.004 mm - 0.063 mm)	13.9	5.0	7.5	13.2	11.2	3.3	10.5	5.9	5.4	24.6	11.3	12.7	5.9	5.1	13.2	11.8	6.4	15.0	35.3	30.2	28.3	36.8	48.1	41.7	47.3	47.1	29.7	38.0	27.6
Clay (<0.004 mm)	7.4	2.1	2.6	4.1	8.5	1.3	7.1	5.8	4.2	19.1	8.8	10.5	3.5	4.1	8.5	6.9	3.0	7.2	27.8	21.1	16.1	22.5	21.4	20.3	19.0	29.8	20.1	25.2	26.0
SEDIMENT CONVENTIONALS																													
Ammonia (mg/Kg)	10U	10U	10U	10U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total sulfides (mg/Kg, dry)	13	0.1U	1.3	0.1U	37	0.10U	13	0.30	9.4	12	0.13	9.7	0.10	1.7	23	2.9	0.10U	1.1	27	10	2.5	0.52	33	7.7	20	11	130	0.10U	0.38
Total Volatile Solids (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water soluble sulfides (mg/Kg, dry)	0.2	0.1U	0.1U	0.1U	0.39	0.10U	0.17	0.10U	0.60	0.18	0.10U	0.10U	0.10U	0.11	0.18	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.28	0.12	0.11	0.10U	0.10U	0.10U
Oil and Grease (mg/Kg, dry)	100U	100U	100U	100U	250	100U	120	100U	100U	150	100U	270	100U	100	190	260	100U	100U	170	230	100U	310	750	760	560	140	350	110	100U
TRPH (mg/Kg, dry)	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U	110	100U	100U	150	380	420	300	100U	170	100U	100U
% Solids (%)	75	80	79	81	73	79	76	79	81	70	82	74	81	77	78	79	77	81	70	72	77	70	70	71	69	55	54	62	47
TOC (%)	0.3	0.1U	0.2	0.1U	0.37	0.10U	0.36	0.20	0.21	0.6	0.14	0.47	0.10U	0.21	0.36	0.26	0.10U	0.10U	0.94	0.45	0.34	0.45	0.70	0.56	0.52	1.7	1.3	1.2	1.4
METALS (mg/Kg, dry wt)																													
Arsenic	2.3	1.6	0.7	0.4	4.1	1.3	6.4	3.5	3.9	4.1	4.0	0.87	2.0	0.71	0.80	0.79	0.78	1.3	0.79	0.52	1.6	0.55	0.57	0.95	1.8	4.7	**8.7**	3.1	4.8
Cadmium	0.2	0.1	0.1	0.1	0.26	0.10U	0.21	0.22	0.11	0.28	0.10U	0.27	0.10U	0.10U	0.19	0.21	0.10U	0.31	0.46	0.64	0.26	0.27	0.50	0.64	0.17	**1.9**	**1.7**	**1.9**	**13**
Chromium	28	17	23	25	33	16	28	24	21	46	26	37	17	22	33	32	27	35	39	42	26	35	46	44	51	**86**	78	**110**	**<u>140</u>**
Copper	19	7.9	14	14	**36**	10	25	17	18	**35**	13	31	6.6	16	29	27	13	25	**35**	31	21	28	**45**	**43**	**48**	**71**	**73**	**75**	**78**
Lead	8.2	3.9	6.3	4.2	22	3.5	16	6.1	7.6	20	5.7	31	3.4	9.4	17	20	4.5	8.6	19	21	11	19	41	40	24	21	40	8.0	6.2
Mercury	0.07	0.04	0.09	0.06	**0.17**	0.10U	0.14	0.043	0.063	**0.15**	0.048	**0.16**	0.020U	0.050	0.11	**0.17**	0.035	0.052	**0.19**	**0.20**	0.12	**0.20**	**0.37**	**0.35**	**0.25**	**0.23**	**0.36**	0.11	0.099
Nickel	13	10	12	15	19	11	16	16	13	**27**	16	19	10	12	18	17	16	**23**	**24**	**25**	16	**21**	**25**	**26**	**39**	**<u>55</u>**	**41**	**<u>95</u>**	**<u>110</u>**
Selenium	0.1	0.1U	0.1U	0.1U	0.31	0.10U	0.19	0.10U	0.11	0.27	0.15	0.31	0.10	0.21	0.13	0.18	0.19	0.19	1.7	1.2	0.22	0.93	0.39	1.1	1.3	7.0	2.8	11	17
Silver	0.1U	0.1U	0.1U	0.1U	0.15	0.10U	0.12	0.10U	0.10U	0.13	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10	0.11	0.10U	0.10U	0.18	0.21	0.10	0.70	0.64	0.80	**1.5**
Zinc	54	28	50	53	90	42	68	52	51	100	55	86	31	52	78	78	54	77	87	79	55	75	110	110	94	140	**150**	**200**	**180**
ORGANOTINS (ppb, dry weight)																													
Dibutyltin	7	1.0U	4	1.0U	16	1.0U	5.6	1.5	6.7	9.4	1.0U	28	1.0U	11	19	12	1.0U	1.0U	13	18	8.5	9.7	35	14	23	8.7	29	1.0U	1.0U
Monobutyltin	3.0	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U
Tetrabutyltin	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U
Tributyltin	37	1.0U	6.0	1.0U	70	1.0U	19	2.1	28	20.0	1.9	64	1.0U	42	55	31	1.0U	1.0U	27	40	19	15	75	17	26	38	120	1.0U	1.0U
CHLORINATED PESTICIDES (ppb, dry weight)																													
Aldrin	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.31U	0.36U	0.30U	0.34U	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	0.36U	0.35U	0.33U	0.36U	0.36U	0.35U	0.36U	0.45U	0.46U	0.40U	0.53U
alpha-BHC	0.33U	1.8	0.32U	0.91	4.0	0.31U	3.1	0.82	0.31U	0.36U	0.30U	0.34U	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	4.7	3.7	1.4	5.1	11	2.2	3.2	1.4	2.0	0.40U	0.53U
beta-BHC	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.31U	0.36U	0.30U	0.34U	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	0.36U	0.35U	0.33U	0.36U	0.36U	0.35U	0.36U	0.45U	0.46U	0.40U	0.53U
delta-BHC	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.31U	0.36U	0.30U	0.34U	1.4	0.33U	0.32U	0.32U	0.32U	0.31U	0.36U	0.35U	0.33U	0.36U	0.36U	0.35U	0.36U	0.45U	0.46U	0.40U	0.53U
gamma-BHC (lindane)	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.31U	0.36U	0.30U	0.34U	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	0.36U	0.35U	0.33U	0.36U	0.36U	0.35U	0.36U	0.45U	0.46U	0.40U	0.53U
alpha-Chlordane	3.3U	3.1U	3.2U	3.1U	3.4U	3.1U	3.3U	3.2U	3.1U	3.6U	3.0U	3.4U	3.1U	3.3U	3.2U	3.2U	3.2U	3.1U	3.6U	3.5U	3.3U	3.6U	3.6U	3.5U	3.6U	4.5U	4.6U	4.0U	5.3U
gamma-Chlordane	3.3U	3.1U	3.2U	3.1U	3.4U	3.1U	3.3U	3.2U	3.1U	3.6U	3.0U	3.4U	3.1U	3.3U	3.2U	3.2U	3.2U	3.1U	3.6U	3.5U	3.3U	3.6U	3.6U	3.5U	3.6U	4.5U	4.6U	4.0U	5.3U
4,4'-DDD	0.72	0.31U	0.67	0.31U	4.7	0.31U	1.4	0.32U	0.58	1.8	0.30U	0.34U	0.31U	0.72	5.9	3.5	1.1	0.31U	3.0	3.9	1.3	1.3	12	5.1	5.6	5.8	6.6	0.40U	0.53U
4,4'-DDE	**24**	0.31	**15**	0.46	**<u>36</u>**	0.31U	**16**	**2.7**	**9.2**	**9.8**	0.52	**<u>34</u>**	0.31U	**6.9**	**<u>27</u>**	**14**	**23**	0.48	**<u>30</u>**	**<u>29</u>**	**6.9**	**21**	**<u>34</u>**	**14**	**20**	**<u>130</u>**	**<u>170</u>**	0.40U	1.0
4,4'-DDT	0.33U	0.31U	0.32U	0.31U	5.9	0.31U	2.2	0.32U	0.69	0.81	0.30U	0.34U	0.31U	4.4	4.7	1.4	0.40	0.31U	2.6	3.2	0.54	0.36U	10	2.1	1.0	0.98	0.96	0.40U	0.53U
Total DDTs	**24.72**	0.31	**15.67**	0.46	**<u>46.6</u>**	0.31U	**19.6**	**2.7**	**10.5**	**12.4**	0.52	**34**	0.31U	**12.0**	**37.6**	**18.9**	**24.5**	0.48	**35.6**	**36.1**	**8.7**	**22.3**	**<u>56</u>**	**21.2**	**26.6**	**<u>137</u>**	**<u>178</u>**	0.40U	1.0

Bold values equal or exceed the ERL.

Bold and underlined values equal or exceed the ERM.

"U" Qualifier denotes analyte not detected at method detection limit

" U* " Qualifier denotes reporting limit raised due to matrix interference

* Individual core results are available in September 1997 report " Environmental Evaluation of Sediments for the Channel Deepening Program Port of Los Angeles - Vol. 1"

Table 2. Bulk Sediment Chemistry Results: Borrow - 1996 / Channel Deepening - 1997 (Kinnetic Laboratories/ToxScan 1996; 1997). (page 2 of 2)

	BORROW 1996				CHANNEL DEEPENING PROJECT 1997*																						
Analytical Parameter	CG-1A TOP	CG-1A BOT	CG-1B TOP	CG-1B BOT	CG-2A TOP	CG-2A BOT	CG-2B TOP	CG-2B BOT	CG-2C BOT	CG-3A TOP	CG-3A BOT	CG-3B TOP	CG-3B BOT	CG-3C BOT	CG-4A TOP	CG-4A BOT	CG-4B TOP	CG-4B BOT	FG1A	FG1B	FG2A	FG2B	FG3A	FG3B	FG3C	FM1A	FM1B	FM1-2	FM1-8
CHLORINATED PESTICIDES (Continued)																													
Dieldrin	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.31U	0.36U	0.30U	0.34U	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	0.37	0.37	0.33U	0.36U	1.7	0.45	0.36U	0.45U	0.46U	0.40U	0.53U
Endosulfan I	1.3U	1.3U	1.3U	1.2U	1.4U	1.3U	1.3U	1.3U	1.2U	1.4U	1.2U	1.4U	1.2U	1.3U	1.3U	1.3U	1.3U	1.2U	1.4U	1.4U	1.3U	1.4U	1.4U	1.4U	1.4U	1.8U	1.8U	1.6U	2.1U
Endosulfan II	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.31U	0.36U	0.30U	0.34U	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	0.36U	0.35U	0.33U	0.36U	0.36U	0.35U	0.36U	0.45U	0.46U	0.40U	0.53U
Endosulfan sulfate	6.7U	6.3U	6.3U	6.2U	6.9U	6.3U	6.6U	6.4U	6.2U	7.1U	6.1U	6.8U	6.2U	6.5U	6.4U	6.3U	6.5U	6.2U	7.1U	6.9U	6.5U	7.1U	7.1U	7.0U	7.2U	9.1U	9.2U	8.1U	11U
Endrin	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.59	2.1	0.30U	0.34U	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	0.36U	0.35U	0.33U	0.36U	0.36U	0.35U	0.36U	0.45U	0.46U	0.40U	0.53U
Endrin Aldehyde	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.31U	0.36U	0.30U	0.34U	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	0.36U	0.35U	0.33U	0.36U	0.36U	0.35U	0.36U	0.45U	0.46U	0.40U	0.53U
Endrin Ketone	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.31U	0.36U	0.30U	2.2	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	0.36U	0.35U	0.33U	0.36U	0.36U	0.35U	0.36U	0.45U	0.46U	0.40U	0.53U
Heptachlor	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.31U	0.36U	0.30U	0.34U	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	0.36U	0.35U	0.33U	0.36U	0.36U	0.35U	0.36U	0.45U	0.46U	0.40U	0.53U
Heptachlor epoxide	0.33U	0.31U	0.32U	0.31U	0.34U	0.31U	0.33U	0.32U	0.31U	0.36U	0.30U	0.34U	0.31U	0.33U	0.32U	0.32U	0.32U	0.31U	0.36U	0.35U	0.33U	0.36U	0.36U	0.35U	0.36U	0.45U	0.46U	0.40U	0.53U
Toxaphene	20U	19U	19U	18U	21U	19U	20U	19U	19U	21U	18U	20U	18U	20U	19U	19U	19U	19U	21U	21U	20U	21U	21U	21U	22U	27U	28U	24U	32U
Methoxychor	6.7U	6.3U	6.3U	6.2U	6.9U	6.3U	6.6U	6.4U	6.2U	7.1U	6.1U	6.8U	6.2U	6.5U	6.4U	6.3U	6.5U	6.2U	7.1U	6.9U	6.5U	7.1U	7.1U	7.0U	7.2U	9.1U	9.2U	8.1U	11U
PCBs (ppb, dry weight)																													
PCB 1242	13U	13U	13U	12U	14U	13U	13U	13U	12U	14U	12U	14U	12U	13U	13U	13U	13U	12U	14U	14U	13U	14U	14U	14U	14U	18U	18U	16U	21U
PCB 1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB 1254	13U	13U	13U	12U	64	13U	24	13U	12U	65	12U	180	12U	33	60	47	79	12U	50	53	26	130	100	42	46	65	130	16U	21U
PCB 1260	13U	13U	13U	12U	14U	13U	13U	13U	12U	14U	12U	14U	12U	13U	13U	13U	13U	12U	14U	14U	13U	14U	14U	14U	14U	18U	18U	16U	21U
Total PCBs	13U	13U	13U	12U	**64**	13U	**24**	13U	12U	**65**	12U	**180**	12U	**33**	**60**	**47**	**79**	12U	**50**	**53**	**26**	**130**	**100**	**42**	**46**	**65**	**130**	16U	21U
SEMI-VOLATILES (ppb, dry wt)																													
Naphthalene	10U	9.4U	9.5U	9.2U	10U	9.4U	9.8U	9.6U	9.3U	11U	9.1U	10	9.2U	9.8U	9.6U	9.5U	9.7U	9.3U	11U	10U	9.8U	11U	11U	11U	11U	14U	14U	12U	16U
Acenaphthylene	10U	9.4U	9.5U	9.2U	10U	9.4U	9.8U	9.6U	9.3U	11U	9.1U	18	9.2U	9.8U	11	9.5U	9.7U	9.3U	11U	17	9.8U	11U	26	14	12	14U	22	12U	16U
Acenaphthene	10U	9.4U	9.5U	9.2U	10U	9.4U	9.8U	9.6U	9.3U	11U	9.1U	13	9.2U	9.8U	9.6U	9.5U	9.7U	9.3U	11U	10U	9.8U	11U	11U	11U	11U	14U	14U	12U	16U
Fluorene	10U	9.4U	9.5U	9.2U	10U	9.4U	9.8U	9.6U	9.3U	11U	9.1U	18	9.2U	9.8U	9.6U	9.5U	9.7U	9.3U	11U	10U	9.8U	11U	11U	11U	11U	14U	14U	12U	16U
Phenanthrene	12	9.4U	9.5U	9.2U	25	9.4U	24	9.6U	9.3U	11	9.1U	37	9.2U	9.8U	18	15	9.7U	9.3U	16	25	26	11U	54	25	67	24	46	12U	16U
Anthracene	10U	9.4U	9.5U	9.2U	32	9.4U	11	9.6U	9.3U	20	9.1U	65	9.2U	12	29	15	9.7U	9.3U	20	36	26	21	53	53	38	20	46	12U	16U
Fluoranthene	21	9.4U	19	9.2U	80	9.4U	41	9.6U	12	14	9.1U	470	9.2U	17	35	19	9.7U	9.3U	30	43	29	21	76	53	81	45	85	12U	16U
Pyrene	39	9.4U	21	17	130	9.4U	58	9.6U	22	43	9.1U	**1500**	9.2U	38	56	29	11	9.3U	58	97	41	69	190	410	110	73	110	12U	34
Benzo(a)anthracene	19	9.4U	12	9.2U	47	9.4U	18	9.6U	12	13	9.1U	220	9.2U	13	28	18	9.7U	9.3U	27	37	24	17	67	170	58	38	68	12U	16U
Chrysene	32	9.4U	30	9.2U	84	9.4U	34	9.6U	26	24	9.1U	240	9.2U	27	64	33	12	9.3U	47	72	47	39	120	310	80	51	96	12U	16U
Benzo(b)fluoranthene	45	9.4U	44	9.2U	190	9.4U	71	12	51	120	9.1U	450	9.2U	94	220	96	36	9.3U	130	210	160	110	260	170	230	110	200	12U	16U
Benzo(k)fluoranthene	44	9.4U	42	9.2U	180	9.4U	63	9.7	45	100	9.1U	350	9.2U	74	200	81	30	9.3U	100	180	120	84	240	140	190	85	180	12U	16U
Benzo(a)pyrene	40	9.4U	34	9.2U	140	9.4U	56	11	35	92	9.1U	320	9.2U	74	140	80	34	9.3U	87	150	82	90	230	200	170	96	150	12U	16U
Indeno[1,2,3-CD]pyrene	19	13U	19U*	12U	88	13U	34	13U	20	45	12U	200	12U	47	130	58	25	12U	51	90	60	44	130	86	110	18U	90	16U	21U
Dibenzo(a,h)anthracene	13U	13U	13U	12U	23	13U	13U	13U	12U	16	12U	64	12U	13U	38	13U	13U	12U	14U	14U	18	16	44	45	36	18U	28	16U	21U
Benzo[ghi]perylene	20U*	13U	19U*	12U	75	13U	33	13U	17	38	12U	120	12U	44	110	57	13U	12U	50	80	55	47	130	110	120	51	28	16U	21U
Benzo(e)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total detectable PAHs	270	9.4-13U	9.5-19U	9.2-12U	1100	9.4-13U	440	33	240	540	9.1-12U	**4100**	9.2-12U	440	1100	500	150	9.3-12U	620	1000	690	560	1600	1800	1300	590	1100	12-16U	34
Total Phthalates	10U	9.4U	9.5U	9.2U	390	52	410	80	200	250	130	470	220	310	560	470	230	130	250	840	280	250	1000	640	690	620	710	300	470
Total Phenols	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Bold values equal or exceed the ERL.

Bold and underlined values equal or exceed the ERM.

"U" Qualifier denotes analyte not detected at method detection limit

" U* " Qualifier denotes reporting limit raised due to matrix interference

* Individual core results are available in September 1997 report " Environmental Evaluation of Sediments for the Channel Deepening Program Port of Los Angeles - Vol. 1"

Table 3. Elutriate Chemistry Results: Port of Los Angeles 2001 Deepening Project (Kinnetic Laboratories/ToxScan 1996; 1997). (Page 1 of 2)

	BORROW 1996					CHANNEL DEEPENING PROJECT 1997*															
Analytical Parameter	CG-1A TOP	CG-1A BOT	CG-1B TOP	CG-1B BOT	Harbor Water	CG-2A TOP	CG-2A BOT	CG-2B TOP	CG-2B BOT	CG-2C BOT	CG-3A TOP	CG-3A BOT	CG-3B TOP	CG-3B BOT	CG-3C BOT	CG-4A TOP	CG-4A BOT	CG-4B TOP	CG-4B BOT	Harbor Water	WQS Salt Water Max EPA 2000	WQS Salt Water Cont EPA 2000
CONVENTIONALS																					
Ammonia (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Water soluble sulfides (mg/L)	0.5U	0.5U	0.5U	0.5U	0.5U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U		
Oil and Grease (mg/L)	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U		
METALS (µg/L, wet wt)																						
Arsenic	3.0	1.5	4.2	1.6	2.3	9.4	1.2	5.6	3.7	2.1	10	3.6	6.8	1.8	3.1	6.0	2.1	8.5	4.0	6.8	69	36
Cadmium	0.07	0.17	0.07	0.15	0.07	0.29	0.18	0.24	0.40	0.22	0.35	0.31	0.38	0.31	0.16	0.22	0.21	0.26	0.33	0.19	42	9.3
Chromium	0.5U	0.5U	0.5U	0.5U	0.5U	20	21	57	20	20	20	20	28	18	18	18	21	23	21	21	1100	50
Copper	1.2	3.8	14	7.9	9.9	2.1	3.4	1.8	1.9	1.7	1.5	2.1	1.6	2.6	1.5	1.1	2.2	1.1	1.7	5.2	4.8	3.1
Lead	0.7	0.1	0.4	0.5	0.4	0.67	0.43	0.67	0.51	0.71	0.57	0.32	0.70	0.52	0.58	0.42	0.28	0.49	0.39	0.53	210	8.1
Mercury	0.1U	0.1U	0.1U	0.1U	0.1	0.10U	0.10U	0.14	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.16(a)	0.04 (b)
Nickel	1.7	4.5	60	5.8	5.2	3.4	2.5	2.0	2.7	2.0	1.5	3.3	1.7	2.9	1.2	1.3	5.0	1.3	4.5	2.0	74.0	8.2
Selenium	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	290	71
Silver	0.19	0.06	0.08	0.13	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.06	0.05U	1.90	
Zinc	4.2	12	9.6	5.6	9.7	6.8	26	11	9.2	9.3	13	6.8	5.0	3.6	4.2	3.0	10	3.5	8.0	10	90	81
ORGANOTINS (ppt (ng/L) wet weight)																						
Dibutyltin	2.0U	17	2	8	21	2.0U	44	2.0U	2.0U	2.3	2.0U	3.8	2.0U	2.0U	2.0U	2.0U	6.2	2.0U	14	30		
Monobutyltin	2.0U	2.0U	2.0U	5	3	2.0U	2.3	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.8	2.0U	2.3	3.7		
Tetrabutyltin	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U		
Tributyltin	2.0U	2.0U	2.0U	2.0U	4	4.0	4.6	7.4	4.2	4.2	2.0U	2.0U	3.6	2.0U	2.0U	2.4	2.0U	2.0U	2.0U	7.5		
CHLORINATED PESTICIDES (ppb, wet weight)																						
Aldrin	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	1.3	
alpha-BHC	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U		
beta-BHC	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U		
delta-BHC	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U		
gamma-BHC (lindane)	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.16	
alpha-Chlordane	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.09	0.004
gamma-Chlordane	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.09	0.004
4,4'-DDD	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U		
4,4'-DDE	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U		
4,4'-DDT	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.13	0.001
Total DDTs	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U		

a. Mercury values not established under the California Toxics Rule. Value is the daily maximum from the 1997 Ocean Plan.

"U" Qualifier denotes analyte not detected at method detection limit

b. Mercury values not established under the California Toxics Rule. Value is the 6-month median from the 1997 Ocean Plan.

Bolded values equal or exceed the maximun 4 day average Water Quality Standard

Bolded and underlined values exceed the maximum 1 hour average Water Quality Standard

* Individual core results are available in September 1997 report " Environmental Evaluation of Sediments for the Channel Deepening Program Port of Los Angeles - Vol. 1"

Table 3. Elutriate Chemistry Results: Port of Los Angeles 2001 Deepening Project (Kinnetic Laboratories/ToxScan 1996;1997). (Page 2 of 2)

	BORROW 1996					CHANNEL DEEPENING PROJECT 1997*															
Analytical Parameter	CG-1A TOP	CG-1A BOT	CG-1B TOP	CG-1B BOT	Harbor Water	CG-2A TOP	CG-2A BOT	CG-2B TOP	CG-2B BOT	CG-2C BOT	CG-3A TOP	CG-3A BOT	CG-3B TOP	CG-3B BOT	CG-3C BOT	CG-4A TOP	CG-4A BOT	CG-4B TOP	CG-4B BOT	Harbor Water	WQS Salt Water Max EPA 2000	WQS Salt Water Cont EPA 2000
CHLORINATED PESTICIDES (Continued)																						
Dieldrin	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.71	0.0019
Endosulfan I	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.034	0.0087
Endosulfan II	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.034	0.0087
Endosulfan sulfate	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U		
Endrin	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.037	0.0023
Endrin Aldehyde	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U		
Endrin Ketone	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U		
Heptachlor	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U		
Heptachlor epoxide	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U		
Toxaphene	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U	0.15U		
Methoxychor	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U		
PCBs (ppb, wet weight)																						
PCB 1242	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U		
PCB 1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
PCB 1254	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U		
PCB 1260	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U		
Total PCBs	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U		0.03
SEMI-VOLATILES (ppb, wet wt)																						
Naphthalene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Acenaphthylene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Acenaphthene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Fluorene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Phenanthrene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Anthracene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Fluoranthene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Pyrene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Benzo(a)anthracene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Chrysene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Benzo(b)fluoranthene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Benzo(k)fluoranthene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Benzo(a)pyrene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Indeno[1,2,3-CD]pyrene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Dibenzo(a,h)anthracene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Benzo[ghi]perylene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		
Total detectable PAHs	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U		15
Total Phenols	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		

Bolded values equal or exceed the maximun 4 day average Water Quality Standard

Bolded and underlined values exceed the maximum 1 hour average Water Quality Standard

"U" Qualifier denotes analyte not detected at method detection limit

" U* " Qualifier denotes reporting limit raised due to matrix interference

* Individual core results are available in September 1997 report " Environmental Evaluation of Sediments for the Channel Deepening Program Port of Los Angeles - Vol. 1"

Table 4. Toxicity Results: Channel Deepening - 1997 (Kinnetic Laboratories/ToxScan 1997).

	CHANNEL DEEPENING PROJECT 1997											
	FG-1A	FG-1B	FG-2A	FG-2B	FG-3A	FG-3B	FG-3C	FM-1A	FM-1B	LA2	LA3	CONTROL
Water Column Bioassays (LC50 / EC50)												
Mytilus Survival	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%	NA	NA	>100%
Mytilus Development	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%	NA	NA	>100%
Mysidopsis Survival	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%	NA	NA	>100%
Menidia Survival	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%	NA	NA	>100%
Benthic Bioassays (% Survival)												
Rhepoxynius	81%	79%	77%	**68%**	75%	77%	79%	82%	**72%**	94%	79%	99%
Eohaustorius	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Ampelisca	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Nephtys	92%	90%	93%	95%	99%	97%	99%	**83%**	95%	99%	99%	97%
Mysidopsis	95%	82%	96%	98%	98%	82%	99%	96%	100%	98%	96%	99%

Bolded values indicate toxicity exceeding Limiting Permissible Concentration (LPC) at LA2.

Bolded and underlined values indicate toxicity exceeding Limiting Permissible Concentration (LPC) at LA2 and LA3.

NT = Not tested in this program.

NA = Not applicable - references not tested in water column bioassays.

Table 5. Mean Concentration of Detected Contaminants - *Macoma nasuta* Bioaccumulation (Kinnetic Laboratories/ToxScan 1997).

	CHANNEL DEEPENING PROJECT - 1997										
Analytical Parameter	FG-1A	FG-1B	FG-2A	FG-2B	FG-3A	FG-3B	FG-3C	FM-1A	FM-1B	LA2	LA3
METALS (mg/Kg, dry wt)											
Arsenic	35	29	33	35	34	21	24	28	32	36	32
Chromium	2.5	4.7	3.1	4.5	3.8	2.9	3.6	4.5	3.9	3.4	3.2
Copper	12	11	12	8.5	**13**	7.6	10	**13**	9.2	8.6	8.3
Lead	**3.1**	**3.2**	2.3	**2.7**	**4.4**	**2.7**	**3.8**	1.9	1.9	1.5	1.4
Mercury	**0.2**	0.15	0.16	**0.19**	0.15	0.12	0.14	**0.21**	0.16	0.14	0.14
Nickel	4.1	7.0	4.0	5.6	4.4	3.9	4.9	8.2	5.9	5.5	6.2
Selenium	0.51	0.66	0.69	0.15	0.45	0.46	0.66	0.12	0.13	0.71	0.60
Zinc	92	102	79	76	100	80	100	97	76	78	78
SEMI-VOLATILES (ppb, dry wt)											
Pyrene	ND	ND	ND	184	122	542	ND	ND	135	104[a]	99[a]
Benzo(a)anthracene	ND	ND	ND	ND	ND	195	ND	ND	ND	104[a]	99[a]
Chrysene	ND	ND	ND	ND	ND	482	ND	ND	ND	104[a]	99[a]
Benzo(b)fluoranthene	124	237	146	374	388	267	183	ND	ND	104[a]	99[a]
Benzo(k)fluoranthene	ND	187	ND	259	250	161	107	ND	ND	104[a]	99[a]
Benzo(a)pyrene	ND	113	ND	269	256	289	146	ND	ND	104[a]	99[a]
Total detectable PAHs	124	441	146	1024	896	**1848**	329	ND	135	104[a]	99[a]
CHLORINATED PESTICIDES (ppb, dry weight)											
4,4'-DDD	**23**	8.3	18	**63**	16	7.1	**25**	2.2	11	3.8	1.3[a]
4,4'-DDE	**102**	**91**	45	**95**	**75**	48	**89**	27	51	128	39
4,4'-DDT	10	4.2	8.8	ND	4.7	4.6	ND	ND	ND	ND	1.3[a]
Total DDTs	146	104	72	158	96	60	114	29	62	132	39
Dieldrin	ND	2.9	ND	2.2	3.0	ND	ND	ND	ND	1.3[a]	1.3[a]
PCBs (ppb, dry weight)											
Aroclor 1254	ND	195	ND	**496**	124	ND	235	ND	ND	104[a]	99[a]

Bold and underline values * versus both LA2 and LA3.

Bold values * versus LA3 only.

Underline values * versus LA2 only.

[a] Value represents 1/2 reporting limit, since all replicates were ND.

ND = Not detected

Table 6. Mean Concentration of Detected Contaminants - *Nereis viriens* Bioaccumulation (Kinnetic Laboratories/ToxScan 1997).

	CHANNEL DEEPENING PROJECT - 1997										
Analytical Parameter	FG-1A	FG-1B	FG-2A	FG-2B	FG-3A	FG-3B	FG-3C	FM-1A	FM-1B	LA2	LA3
METALS (mg/Kg, dry wt)											
Arsenic	6.5	15	6.2	15	9.1	4.4	15	14	13	16	14
Chromium	1.2	0.67	1.8	2.1	1.5	0.18	0.46	1.4	1.5	11	3.8
Copper	6.6	6.1	9.5	8.1	7.9	3.4	8.8	7.2	7.0	9.1	8.0
Lead	**1.1**	0.41	0.59	0.76	0.61	ND	**1.1**	**1.3**	0.95	0.55	0.21
Mercury	0.16	0.16	0.16	ND	0.16	0.18	0.29	ND	ND	0.20	0.22
Nickel	1.4	0.3	2.3	2.4	0.82	ND	0.36	1.6	1.9	10	4.5
Selenium	0.45	0.30	0.26	2.5	0.23	0.20	0.25	0.81	2.0	0.62	0.53
Zinc	120	98	184	121	134	86	145	108	111	135	120
SEMI-VOLATILES (ppb, dry wt)											
Pyrene	ND	ND	ND	ND	ND	400	ND	ND	ND	70[a]	73[a]
Total detectable PAHs	ND	ND	ND	ND	ND	400	ND	ND	ND	70[a]	73[a]
CHLORINATED PESTICIDES (ppb, dry weight)											
Aldrin	ND	ND	ND	4.3	3.4	ND	ND	5.3	ND	1.8[a]	1.7[a]
4,4'-DDD	4.2	6.4	ND	ND	14	22	17	ND	ND	1.8[a]	1.7[a]
4,4'-DDE	**18**	**18**	13	14	**21**	**33**	13	8.1	8.8	15	7.5
4,4'-DDT	4.1	ND	4.8	ND	3.8	7.6	ND	ND	ND	6.6	1.7[a]
Total DDTs	26	24	3.9	14	39	63	30	8.1	8.8	23	11
Endrin	ND	ND	22	ND	ND	ND	ND	2.1	ND	4.2	1.7[a]
Heptachlor	ND	ND	ND	ND	ND	5.7	ND	ND	ND	1.8[a]	1.7[a]
PCBs (ppb, dry weight)											
Aroclor 1254	ND	108	ND	386	108	98	ND	ND	ND	70[a]	73[a]

Bold and underline values * versus both LA2 and LA3.

Bold values * versus LA3 only.

Underline values * versus LA2 only.

[a] Value represents 1/2 reporting limit, since all replicates were ND.

ND = Not detected

U.S. ENVIRONMENTAL PROTECTION AGENCY

EVALUATIONS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

May 1, 1998

MEMORANDUM

SUBJECT: Port of Los Angeles, Channel Deepening Program (Main Channel)
FROM: Steven John, U.S. Environmental Protection Agency
TO: Cheryl Conel, U.S. Army Corps of Engineers

The Port of Los Angeles has proposed a project for the deepening of the Main Channel as well as utility crossing removal, replacement and construction. The proposed project would deepen the present -45 feet MLLW channel to -50 feet MLLW, plus two foot overdepth, to accommodate deeper draft vessels. Approximately 4.5 million cubic yards of material would be dredged as part of the deepening project. The Port has proposed to dispose of 2 million cubic yards of coarse-grain dredged material within the Pier 400 Stage II landfill while the remaining 2.5 million cubic yards of material are proposed for ocean disposal.[1]

In support of the proposed project, the Port has conducted physical and chemical evaluations and biological testing of the proposed dredged materials pursuant to the standard methods outlined in the joint Corps and EPA Testing Manual (Evaluation of Dredged Material Proposed for Ocean Disposal). A September 1997 report (Environmental Evaluation of Sediments for the Channel Deepening Program, Port of Los Angeles, Volumes I and II, prepared by Kinnetic Laboratories, Inc. and ToxScan, Inc.) presents the results of these evaluations.[2]

---

[1] The Port, in anticipation of a deficit of material with geotechnical properties suitable for inclusion in the Pier 400 landfill, evaluated the areas within the Main Channel characterized by deposits of predominantly coarse-grain materials to depths of -65 feet MLLW to support potential Main Channel sand mining efforts.

[2] In addition to the September 1997 report, the Port has submitted additional support documents: Channel Deepening Project - draft (October 1997) and final (January 1998) Environmental Impact Report; Geotechnical Evaluation -- Main Channel Deepening Program (Fugro West, Inc., August 1997, Volumes I and II); and Final Report -- Chemical Analysis and Evaluation of Sediments, Stage 1 Pier 400, Main Channel Borrow Area, Directive VII (November 1996, Kinnetic Laboratories, Inc. and ToxScan, Inc.).

EPA's review of the proposed action was conducted in accordance with the Federal Guidelines (40 CFR 230) published pursuant to Section 404 of the Clean Water Act (CWA), Section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA), and Section 10 of the Rivers and Harbors Act.

To facilitate the evaluation of the dredged materials in the project area these materials were split into three distinct categories: (1) coarse-grain sediments (predominantly sand and silty sand with interspersed layers of coarse and fine-grain sediments); (2) fine-grain sediments (silt, sandy silt, clay) with interspersed layers of coarse and fine-grain sediments; and (3) formation material of Malaga Mudstone (silt) deposits and Timms Point Silt (silt, sandy silt, silty sand) deposits. Coarse-grain materials, which are proposed for inclusion in the Pier 400 landfill, were evaluated only for bulk and elutriate chemistry -- no biological testing was conducted on these materials. As the fine-grain and formation materials were determined not to be suitable for structural fill for Pier 400, these materials were evaluated for ocean disposal with bulk chemistry and full Green Book biological testing.

Coarse-Grain Material -- these test areas were split into a top layer (existing elevation down to -52 feet MLLW, representing the proposed deepening project) and a bottom layer (-52 feet to -65 feet MLLW, for the purposes of sand mining material for the Pier 400 landfill). Bulk and elutriate chemistry testing of these proposed dredged materials generally showed low levels of heavy metal contamination and moderate organic contaminant levels in the top layer with even lower metal and organic compound levels in the lower layer. EPA believes all identified dredged materials from the coarse-grain test areas (i.e., CG-2, CG-3, and CG-4) are suitable for use in the Pier 400 landfill. Were these sediments to be proposed for unconfined aquatic disposal, EPA would recommend the sediments be evaluated by full Green Book biological testing.

Fine-Grain Material -- in general, the sediments from the fine-grain test areas had elevated levels of both heavy metals (copper, mercury, nickel, and lead were the most common metals) and organic compounds (DDT, DDE, PCBs being the most common). While the level of metal and organic analytes was consistently greater than for the coarse-grain materials, the levels were generally intermediate between ERL and ERM values.

In the suspended particulate phase bioassay, none of the seven fine-grain composites (FG-1A,B; FG-2A,B; FG-3A,B,C) produced significant toxicity in *Menidia* or *Mysidopsis*. While four of the composites (FG-1A,B; FG-2B; FG-3B) had significant decreased *Mytilus* survival, survival was generally near 87%. The Limiting Permissible Concentration (LPC) was not exceeded for any of these materials. In the solid phase bioassay, none of the seven fine-grain composites produced any significant increased mortality in *Nepthys* or *Mysidopsis* and only FG-2B produced significantly lower survival in *Rhepoxynius* (compared to the LA2 reference site, but not the LA3 reference site). The LPC was exceeded only for the FG-2B materials (due to a greater than 20% difference in survival between the test site and the LA2 reference site).

EX. B 4

None of the seven fine-grain test areas composites produced substantially elevated bioaccumulation of metals or organic compounds. In general, bioaccumulation levels for lead, copper, mercury , DDD and DDE (for this evaluation these were the most commonly bioaccumulated contaminants), for *Macoma* and *Nepthys*, were in the range of 1.5 to 3 times those in tissues from LA2 and LA3 reference site specimens. Test area FG-2B had the widest range of contaminants found to bioaccumulate, generally to levels greater than found for the other fine-grain test areas.

Based on data from the bulk chemistry, the bioassays and the bioaccumulation evaluations, EPA believes that all the proposed dredged materials from test areas FG-1A, FG-1B, FG-2A, FG-3A, FG-3B, and FG-3C are suitable for aquatic disposal at either the LA2 or LA3 ocean disposal sites (there was no substantial difference in the bioassay or bioaccumulation results for these materials when compared to either the LA2 or the LA3 reference sites).

Due to the significant bioassay results and the wider range and higher bioaccumulation levels for test area FG-2B composite, EPA believes some materials in this test area are unsuitable for ocean disposal. Based on the bulk chemistry results for the individual core sample, an area of significantly elevated levels of contamination can be delineated to separate the remaining area of FG-2B which has substantially lower levels of metals and organic analytes. The area around test cores FG2-3 and FG2-8 (westward of a line drawn midway between FG2-6 and FG-2-7 and between FG2-8 and FG2-9, then southward of a line drawn midway between FG2-8 and FG2-10) is unsuitable for ocean disposal or unconfined aquatic disposal. All remaining dredged materials in this test area are determined to be suitable for ocean disposal (see attachment to this memo for diagram delineation suitable and unsuitable areas in FG-2B).

DWP Pipeline Crossing -- The installation of a reclaimed water pipeline crossing the Turning Basin (test area FG-1B) will require dredging a trench to -70 feet MLLW, with two foot overdepth, generating between 100,000 and 150,000 cubic yards of material. Material from the channel edges resulted in significant mortality in the solid phase bioassay (DWP-VA) and significantly elevated bioaccumulation of several organic compounds (DWP-VB). Virgin dredged material (DWP-GEO; -52 to -72 feet MLLW) resulted in no significant mortality in the suspended particulate phase or solid phase bioassays and no elevated bioaccumulation of any analyte. Based on these data, EPA believes dredged materials from DWP-VA and DWP-VB are not suitable for ocean or unconfined aquatic disposal. While the dredged materials from DWP-GEO are suitable for ocean disposal, these materials are predominantly sand and appear to be suitable for inclusion in the Pier 400 landfill (similar in nature to the identified coarse-grain fill materials from the Main Channel). EPA recommends that POLA investigate the beneficial reuse of these materials as structural fill.

Formation Material -- the bulk chemistry results for these materials showed metal levels (cadmium, chromium, copper, mercury, nickel, and zinc) to be relatively highly elevated,

significantly more so than for either the coarse- or fine-grain materials from the inner reaches of the Main Channel. Organic compounds (DDT, DDE, and PCBs) were elevated to relatively high levels and were greater than for other dredged materials in the Main Channel. Supplemental sampling of these materials demonstrated that the metals were found primarily in the formation (lower layer) materials while the organic compounds were distributed primarily in the depositional (top layer) materials.

In the suspended particulate phase bioassay, neither of the formation material test areas (FM-1A or B) produced significant toxicity in *Menidia* or *Mysidopsis*. Both test areas composites had significant decreased *Mytilus* survival, however the LPC was not exceeded for either of these test areas. In the solid phase bioassay, test area FM-1A had no significant decrease in survival for either *Rhepoxynius* or *Mysidopsis*, but *Nepthys* survival was significantly different from both reference sites. The survival differences were less than 20% so the LPC was not exceeded. In test area FM-1B, there was no observed significant toxicity to *Nepthys* or *Mysidopsis*, but *Rhepoxynius* survival was significantly lower for the test materials than for the LA2 reference site. Due to these significant results, the LPC was exceeded for LA2.

Macoma and *Nepthys* specimens exposed to materials from FM-1A showed slight bioaccumulation of copper, mercury and lead on the order of 1.5 times that of the reference site specimens. There was no statistically significant bioaccumulation of any analyte for specimens exposed to materials from test area FM-1B.

While the formation material underlying the depositional layer of these test areas has elevated levels of metals, it appears these are from non-anthropogenic sources and are not subject to bioaccumulation. These results are similar to previous Port of Los Angeles evaluations on Malaga Mudstone and Timms Point Silt deposits in which EPA approved ocean disposal of these types of materials. EPA believes that the formation materials in both test area FM-1A and B are suitable for ocean or unconfined aquatic disposal.

Based on the elevated levels of organic compounds in the depositional layer, and the lack of significant bioassay results from previous evaluations of formation materials similar to those found in the project area, EPA believes the significant bioassay results for the FM test areas are due to the depositional layers. Therefore, EPA believes that these depositional materials are not suitable for ocean disposal and should be disposed of at an approved upland sites or a confined aquatic disposal facility.

Bathymetric Surveys -- For the subsection of test area FG-1B determined not to be suitable for ocean disposal, EPA recommends these materials be dredged and disposed of prior to dredging the remaining FG-1B materials determined to be suitable for ocean disposal. In test areas FG-1B, FM-1A and FM-1B, EPA recommends that a bathymetric survey be conducted following removal of the unsuitable material and prior to dredging of the materials in these test areas

determined to be suitable for ocean disposal. Final approval by the Corps, with EPA concurrence, for ocean disposal of the suitable material from these three test areas should be pending review of this bathymetry survey and demonstration that all unsuitable materials have been removed from the dredge site.

Summary -- Based on the data provided by the Port of Los Angeles, EPA believes the dredged materials in the western portion of test area FG-2B, the top layer depositional material in FM-1A and B, and the materials from DWP-VA and VB are not suitable for ocean disposal. EPA concurs on inclusion of all the coarse-grain dredged materials in Pier 400. Pending demonstration with all other relevant sections of CWA and MPRSA, including evaluation of beneficial reuse of these proposed dredge materials, EPA concurs provisionally on ocean disposal for all the remaining material (identified above) evaluated as part of the Main Channel deepening project.

Thank you for the opportunity to review and comment on this proposed action. If you have any questions about EPA's comments, please contact me at 213/452-3806. EPA's final concurrence on the suitability of dredged materials from the proposed project for ocean disposal will be included in our comments on the Corps Public Notice.

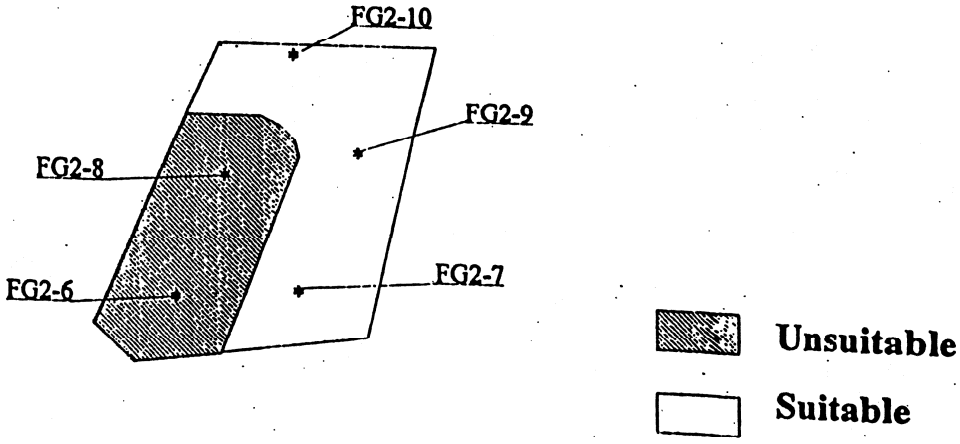
attachment

cc: POLA
CCC

EX. 4

Attachment

Area FG-2B



EX. 4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

May 14, 1998

MEMORANDUM

SUBJECT: Port of Los Angeles Channel Deepening Program (Main Channel)
FROM: Steven John, U.S. Environmental Protection Agency
TO: Cheryl Conel, U.S. Army Corps of Engineers

This Memorandum amends EPA's May 1, 1998 memo regarding the suitability of dredged materials from the proposed Main Channel deepening project for unconfined aquatic disposal at either the LA2 or LA3 ocean disposal sites.

EPA's previous recommendation regarding suitability for unconfined aquatic disposal of dredged materials from the Formation Material test areas (FM-1A and FM-1B) was that the formation materials were suitable for unconfined aquatic disposal while the depositional materials were not suitable for ocean disposal. EPA has conducted an additional evaluation of the data submitted by the Port of Los Angeles to delineate any suitable material in the upper layer. Based on this evaluation, EPA has identified two pockets of material in the depositional layer that are suitable for unconfined aquatic disposal. These areas are:

(1) the eastern portion of FM-1A from a line drawn midway between FM1-1 and FM1-2 and between FM1-3 and FM1-4, then northeastward to the channel edge at a point midway between FM1-3 and FM1-5; and,

(2) the western portion of FM-1B from a line drawn midway between FM1-9 and FM1-10 and between FM1-7 and FM1-8, then southwestward to the channel edge at a point midway between FM1-6 and FM1-8.

The attached figure provides a diagram of the FM test areas and identifies the two areas of the depositional layer determined to be suitable for unconfined aquatic disposal. The remaining depositional layer dredge material within the FM test areas is unsuitable for ocean disposal.[1]

---

[1]The data submitted by the Port does not define the actual elevations (relative to MLLW) delineating the depositional and formation layers. EPA recommends that the Port be required to provide this information for inclusion in the Corps' Public Notice.

All the other recommendations in EPA's May 1, 1998 memorandum remain effective. If you have any questions about this re-evaluation of the depositional layer of the formation material test areas, please contact me at 213/452-3806. EPA's final concurrence on the suitability of dredged materials from the proposed deepening project for ocean disposal will be included in our comments on the Corps Public Notice.

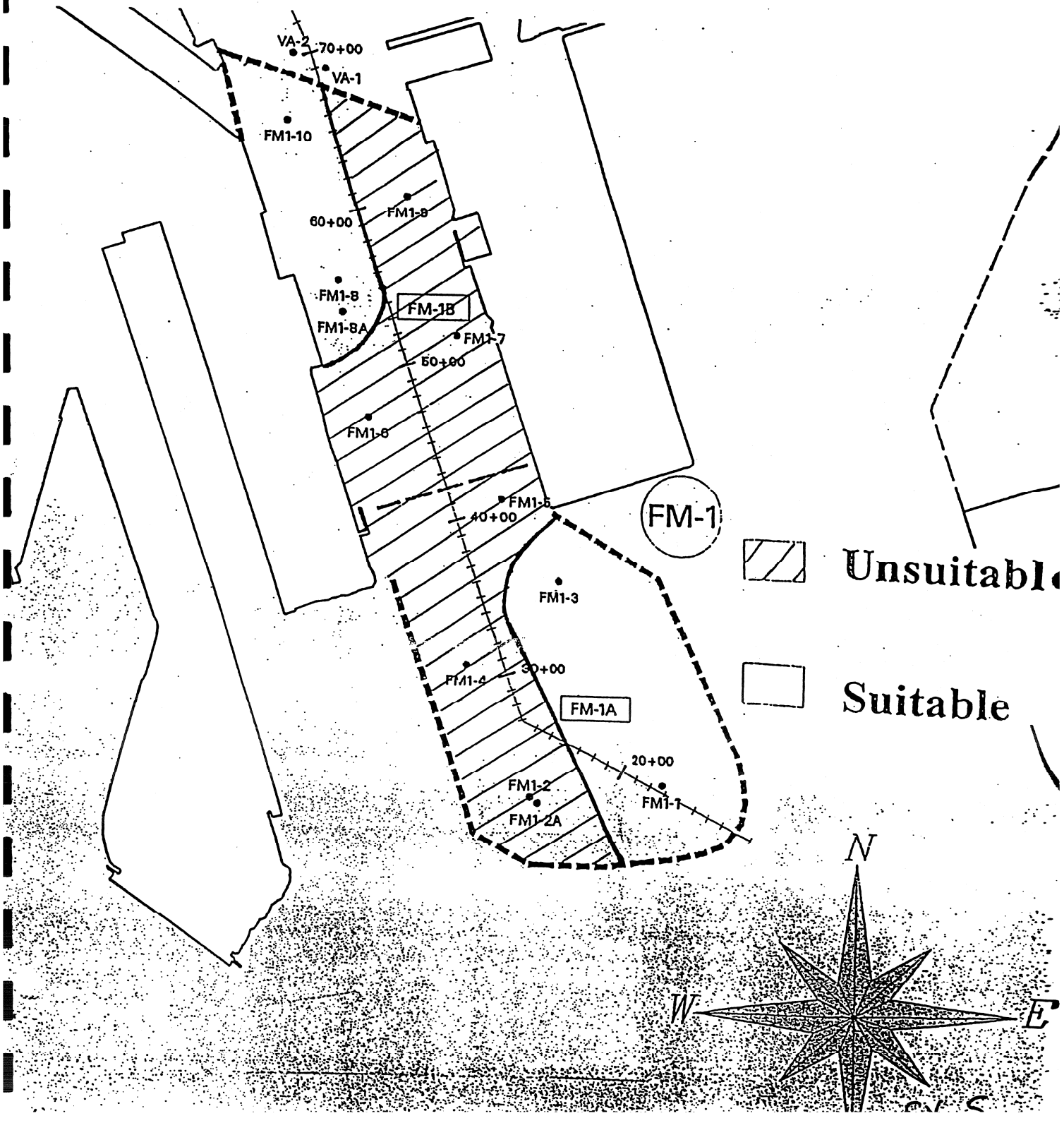
attachment

cc: POLA
CCC

EX. 5

Attachment

Delineation of Suitable and Unsuitable Dredged Materials (Depositional Layer)
Test Areas FM-1A and FM-1B



APPENDIX A-2

RESULTS OF PHYSICAL, CHEMICAL, AND BIOASSAY TESTING OF SEDIMENTS COLLECTED FOR THE PORT OF LOS ANGELES MODIFIED CHANNEL DEEPENING PROGRAM (MEC Analytical Systems, Inc., 2001a)

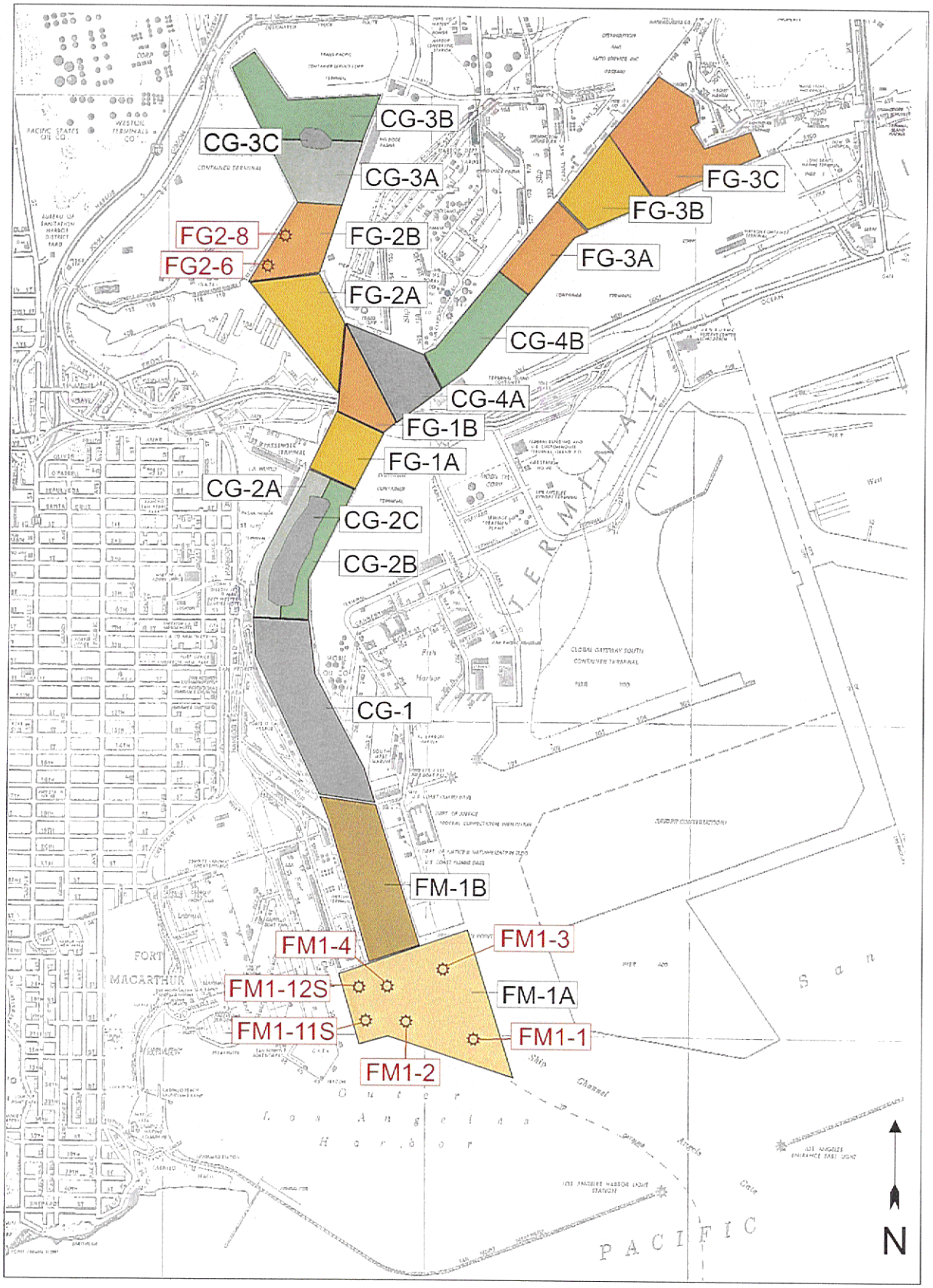


Figure 2. Current and previous sampling locations.

Table 1. Core Locations: MEC - September 2001 (MEC, 2001a)

MODIFIED CHANNEL DEEPENING - SEPTEMBER 2001

Core ID	Latitude (NAD 83)	Longitude (NAD 83)	Seafloor Elevation (feet MLLW)	Length Recovered (feet)	Sampling Interval (feet)	Sampling Interval (feet MLLW)
FG2-6	33° 45.436'	118° 16.640'	-44.0 to -44.2	9.0 to 11.5	8.0 to 11.0	-52.0 to -55.0
FG2-8	33° 45.524'	118° 16.570'	-48.3	4.0 to 4.5	3.7 to 4.5	-52.0 to -52.8
FM1-11S	33° 43.036'	118° 16.248'	-22.0	6.0 to 7.5	0.0 to 7.0	-22.0 to -29.0
FM1-12S	33° 43.151'	118° 16.289'	-19.5	5.5 to 7.0	0.0 to 7.0	-19.5 to -27.0
LA2-REFERENCE	33° 33.200'	118° 10.800'	NA	NA	NA	NA
LA3-REFERENCE	33° 26.000'	117° 55.000'	NA	NA	NA	NA

NA = Not applicable.

Table 2. Bulk Sediment Chemistry Results (MEC, 2001a). (Page 1 of 2)

	MODIFIED CHANNEL DEEPENING - SEPTEMBER 2001					
Analytical Parameter	FM1-12S TOP	FM1-12S BOT-CLAY PLUG	FM1-11S TOP	FM1-11S BOT-CLAY PLUG	FG2-6	FG2-8
GRAIN SIZE (% dry)						
Sand/Gravel (>0.063 mm)	74.6	43.1	69.3	20.3	77.9	32.6
Silt (0.004 mm - 0.063 mm)	18.1	36.0	24.0	47.7	16.3	38.7
Clay (<0.004 mm)	7.4	20.9	6.8	32.1	5.9	28.7
SEDIMENT CONVENTIONALS						
Ammonia (mg/Kg)	12.1	82	10.3	102	4.7	26 - 28*
Total sulfides (mg/Kg, dry)	5.5	0.1U	4.1	2.1	3.5	2.9
Total Volatile Solids (%)	NA	NA	NA	NA	NA	NA
Water soluble sulfides (mg/Kg, dry)	0.1U	0.1U	0.1U	0.2U	0.1U	0.1U
Oil and Grease (mg/Kg, dry)	24	9.9	20	8.2U	20	15.3
TRPH (mg/Kg, dry)	22	8.7	18	8.2U	19	13.3
% Solids (%)	72.8	64.5	72.8	61.0	79.0	72.0
TOC (%)	1.03	2.99	1.03	4.96	0.05	0.19
METALS (mg/Kg, dry wt)						
Arsenic	5.1	**9.9**	4.5	**16.6**	4.3	**22.1**
Cadmium	0.3	**1.2**	0.4	**2.8**	0.1U	0.3
Chromium	16	49.1	13	**81.6**	11.0	36.7
Copper	**62.7**	**51.6**	**38.0**	**79.9**	6.9	**45.8**
Lead	6.7	5.6	7.1	6.7	5.6	17.2
Mercury	0.09	0.08	0.10	**0.19**	0.08	0.11
Nickel	17	**61.9**	13	**87.6**	14	**41.7**
Selenium	0.3	4.9	0.2	9.4	0.1U	0.3
Silver	0.1U	0.5	0.1U	0.8	0.1U	0.1U
Zinc	58	119	55	**153**	39	109
ORGANOTINS (ppb, dry weight)						
Dibutyltin	2.7U	3.1U	2.7U	3.3U	2.5U	2.8U
Monobutyltin	2.7U	3.1U	2.7U	3.3U	2.5U	2.8U
Tetrabutyltin	NA	NA	NA	NA	NA	NA
Tributyltin	1.4U	1.6U	1.4U	1.6U	1.3U	1.4U
CHLORINATED PESTICIDES (ppb, dry weight)						
Aldrin	3U	3U	3U	3U	3U	3U
alpha-BHC	3U	3U	3U	3U	3U	3U
beta-BHC	3U	3U	3U	3U	3U	3U
delta-BHC	3U	3U	3U	3U	3U	3U
gamma-BHC (lindane)	3U	3U	3U	3U	3U	3U
Chlordane	14U	16U	14U	16U	13U	14U
4,4'-DDD	3U	3U	3U	3U	3U	3U
4,4'-DDE	**7**	3U	**8**	3U - **4.4***	3U	3U
4,4'-DDT	3U	3U	3U	3U	3U	3U
Total DDTs	**7**	3U	**8**	3U - **4.4**	3U	3U

Bold values equal or exceed the ERL.

Bold and underlined values equal or exceed the ERM.

* Duplicate analysis produced different results

"U" Qualifier denotes analyte not detected at method detection limit

Table 2. Bulk Sediment Chemistry Results (MEC, 2001a). (Page 2 of 2)

	MODIFIED CHANNEL DEEPENING - SEPTEMBER 2001					
Analytical Parameter	FM1-12S TOP	FM1-12S BOT-CLAY PLUG	FM1-11S TOP	FM1-11S BOT-CLAY PLUG	FG2-6	FG2-8
CHLORINATED PESTICIDES (Continued)						
Dieldrin	3	3U	3U	3U	3U	3U
Endosulfan I	3U	3U	3U	3U	3U	3U
Endosulfan II	3U	3U	3U	3U	3U	3U
Endosulfan sulfate	3U	3U	3U	3U	3U	3U
Endrin	3U	3U	3U	3U	3U	3U
Endrin Aldehyde	3U	3U	3U	3U	3U	3U
Endrin Ketone	NA	NA	NA	NA	NA	NA
Heptachlor	3U	3U	3U	3U	3U	3U
Heptachlor epoxide	3U	3U	3U	3U	3U	3U
Toxaphene	34U	47U	34U	49U	32U	42U
Methoxychor	3U	6U	3U	7U	3U	6U
PCBs (ppb, dry weight)						
PCB 1242	14U	16U	14U	16U	13U	14U
PCB 1248	14U	16U	14U	16U	13U	14U
PCB 1254	**38**	16U	**39**	16U - **36***	**82**	14U
PCB 1260	14U	16U	14U	16U	13U	**176**
Total PCBs	38	16U	39	16U	82	176
SEMI-VOLATILES (ppb, dry wt)						
Naphthalene	14U	16U	14U	16U	13U	14U
Acenaphthylene	14U	16U	14U	16U	13U	14U
Acenaphthene	14U	16U	14U	16U	13U	14U
Fluorene	14U	16U	14U	16U	13U	14U
Phenanthrene	14U	16U	14U	16U	13U	14U
Anthracene	14U	16U	14U	16U	13U	14U
Fluoranthene	14U	16U	14U	16U	13U	14U
Pyrene	14U	16U	14U	16U	13U	14U
Benzo(a)anthracene	14U	16U	14U	16U	13U	14U
Chrysene	14U	16U	14U	16U	13U	14U
Benzo(b)fluoranthene	14U	16U	14U	16U	13U	31
Benzo(k)fluoranthene	14U	16U	14U	16U	13U	14U
Benzo(a)pyrene	14U	16U	14U	16U	13U	14U
Indeno[1,2,3-CD]pyrene	14U	16U	14U	16U	13U	14U
Dibenzo(a,h)anthracene	14U	16U	14U	16U	13U	14U
Benzo[ghi]perylene	14U	16U	14U	16U	13U	14U
Benzo(e)pyrene	NA	NA	NA	NA	NA	NA
Total detectable PAHs	14U	16U	14U	16U	13U	31
Total Phthalates	33	16U	27U	16U	25U	29
Total Phenols	27U - 137U	31U - 155U	27U - 137U	33U - 164U	25U - 127U	28U - 139U

Bold values equal or exceed the ERL.

Bold and underlined values equal or exceed the ERM.

* Duplicate analysis produced different results

"U" Qualifier denotes analyte not detected at method detection limit

Table 3. Toxicity Table (MEC, 2001a).

	MODIFIED CHANNEL DEEPENING - SEPTEMBER 2001					
	FG2-6	FM1-12S	FM1-11S	LA2	LA3	CONTROL
Water Column Bioassays (LC50 / EC50)						
Mytilus Survival	>100%	>100%	>100%	NA	NA	>100%
Mytilus Development	>100%	>100%	>100%	NA	NA	>100%
Mysidopsis Survival	>100%	>100%	>100%	NA	NA	>100%
Menidia Survival	>100%	>100%	>100%	NA	NA	>100%
Benthic Bioassays (% Survival)						
Rhepoxynius	NT	NT	NT	NT	NT	NT
Eohaustorius	83%	95%	93%	90%	66%	93%
Ampelisca	NT	NT	NT	NT	NT	NT
Nephtys	90%	95%	88%	94%	94%	95%
Mysidopsis	NT	NT	NT	NT	NT	NT

Bolded values indicate toxicity exceeding Limiting Permissible Concentration (LPC) at LA2.

Bolded and underlined values indicate toxicity exceeding Limiting Permissible Concentration (LPC) at LA2 and LA3.

NT = Not tested in this program.

Table 4. Mean Concentration of Detected Contaminants - *Macoma nasuta* Bioaccumulation (MEC, 2001a).

	MODIFIED CHANNEL DEEPENING - 2001				
Analytical Parameter	FG2-6	FM1-12S	FM1-11S	LA2	LA3
METALS (mg/Kg, dry wt)					
Arsenic	2.1	2.5	2.4	2.1	2.1
Chromium	0.28	0.08	0.08	0.30	0.32
Copper	0.88	**1.4**	**1.4**	1.1	0.86
Lead	0.17	0.22	0.24	0.14	0.12
Mercury	0.015	0.009	0.011	0.014	0.014
Nickel	0.38	0.44	0.42	0.40	0.50
Selenium	0.16	0.24	0.26	0.18	0.20
Zinc	8.4	10.6	9.9	7.6	8.4
SEMI-VOLATILES (ppb, dry wt)					
Pyrene	10.7	ND	ND	6.12	10.5
Benzo(b)fluoranthene	12.9	ND	ND	5[a]	5[a]
Total detectable PAHs	**<u>22.6</u>**	ND	ND	6.12	10.5
CHLORINATED PESTICIDES (ppb, dry weight)					
4,4'-DDE	3.4	7.3	5.6	10.0	4.5

Bold and underline values * versus both LA2 and LA3.

Bold values * versus LA3 only.

Underline values * versus LA2 only.

[a] Value represents 1/2 reporting limit, since all replicates were ND.

ND = Not detected

Table 5. Mean Concentration of Detected Contaminants - *Nephtys caecoides* Bioaccumulation (MEC, 2001a).

	MODIFIED CHANNEL DEEPENING - 2001				
Analytical Parameter	FG2-6	FM1-12S	FM1-11S	LA2	LA3
METALS (mg/Kg, dry wt)					
Arsenic	5.1	4.5	4.7	4.1	4.5
Cadmium	0.35	0.30	0.30	0.28	0.27
Copper	2.0	1.5	1.6	2.0	1.9
Lead	0.15	0.30	0.20	0.14	0.17
Mercury	0.008	ND	0.005	0.023	0.05[a]
Nickel	0.45	0.40	0.34	0.48	0.4
Selenium	0.68	0.62	0.60	0.56	0.53
Zinc	**36.3**	**36.6**	35.1	31.4	31.2
CHLORINATED PESTICIDES (ppb, dry weight)					
4,4'-DDE	6.27	5.13	7.36	11.9	5.69
PCBs (ppb, dry weight)					
Aroclor 1254	**69**	ND	ND	25[a]	25[a]

Bold and underline values * versus both LA2 and LA3.

Bold values * versus LA3 only.

Underline values * versus LA2 only.

[a] Value represents 1/2 reporting limit, since all replicates were ND.

ND = Not detected

APPENDIX B

SOUTHWEST SLIP AREA

APPENDIX B-1

CHEMICAL AND BIOLOGICAL ANALYSIS OF SEDIMENTS IN THE SOUTHWEST SLIP PROJECT AREA
(Kinnetic Laboratories/ToxScan, 2001a)

Southwest Slip Fill Areas

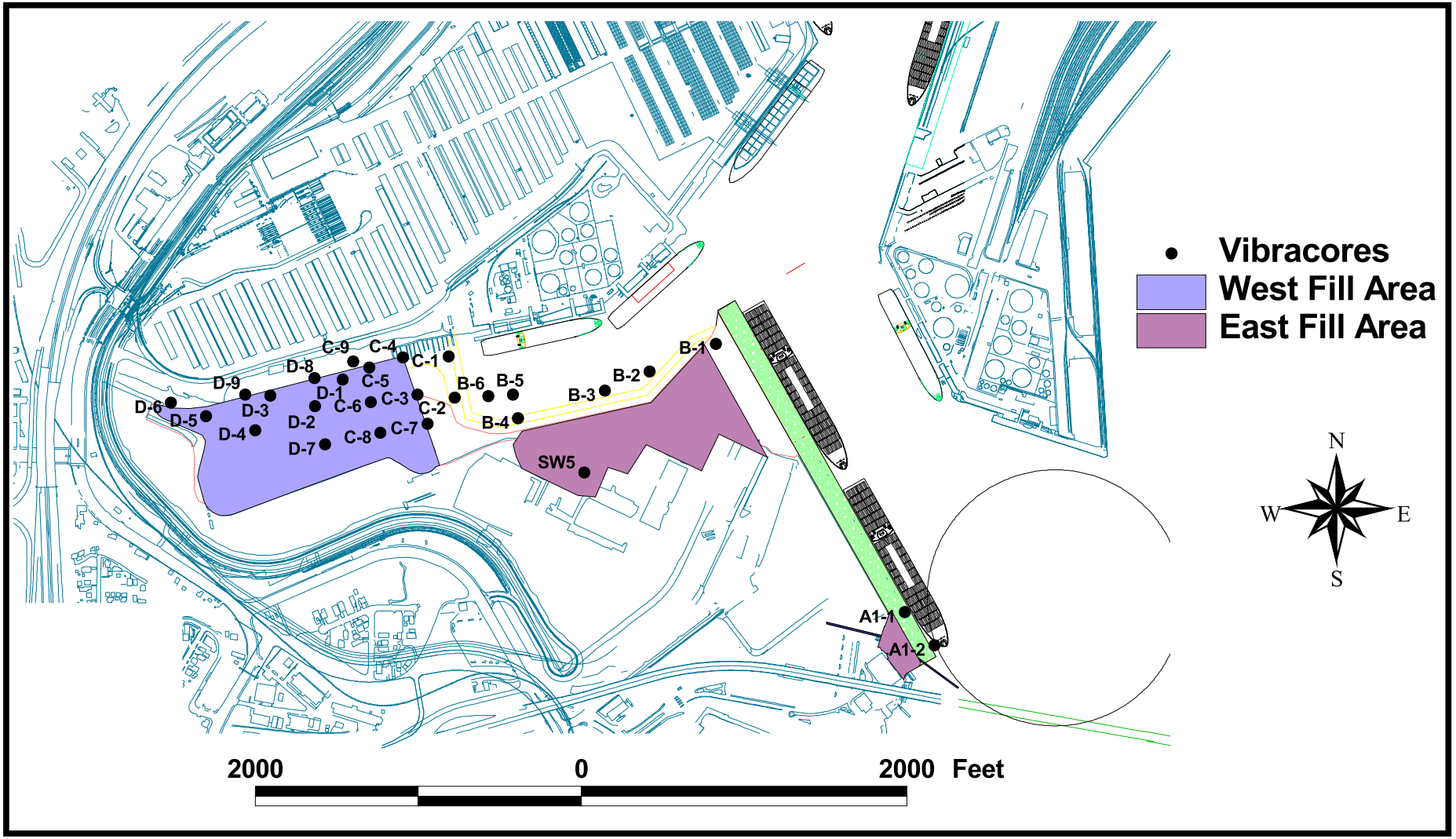


Table 1. Core Locations: Southwest Basin 2001.

SOUTHWEST BASIN 2001						
Core ID	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Seafloor Elevation (feet MLLW)**	**Length Recovered (feet)**	**Sampling Interval (feet)**	**Sampling Interval (feet MLLW)**
Subunit A						
A1-1	33° 45.171'	118° 16.428'	-44.8	16.5	0.0 to 5.5	-44.8 to -50.3
					5.5 to 16.5	-50.3 to -61.3
A1-2	33° 45.037'	118° 16.392'	-46.0	15.6	0.0 to 5.0	-46.0 to -51.0
					5.0 to 15.6	-51.0 to -61.6
Subunit B						
B-1	33° 45.342'	118° 16.658'	-45.6	10.5	0.0 to 5.0	-45.6 to -50.6
					5.0 to 10.5	-50.6 to -56.1
B-2	33° 45.314'	118° 16.738'	-36.8	15.5	0.0 to 5.0	-36.8 to -41.8
					5.0 to 15.5	-41.8 to -52.3
B-3	33° 45.294'	118° 16.792'	-32.3	18.8	0.0 to 5.0	-32.3 to -37.3
					5.0 to 18.8	-37.3 to -51.1
B-4	33° 45.266'	118° 16.897'	-43.0	11.0	0.0 to 5.0	-43.0 to -48.0
					5.0 to 11.0	-48.0 to -54.0
B-5	33° 45.290'	118° 16.903'	-40.0	13.0	0.0 to 5.0	-40.0 to -45.0
					5.0 to 13.0	-45.0 to -53.0
B-6	33° 45.288'	118° 16.933'	-27.3	13.0	0.0 to 6.4	-27.3 to -33.7
					6.4 to 13.0	-33.7 to -40.3
Subunit C						
C-1	33° 45.328'	118° 16.982'	-31.8	12.5	0.0 to 5.0	-31.8 to -36.8
					5.0 to 12.5	-36.8 to -44.3
C-2	33° 45.287'	118° 16.974'	-33.0	13.0	0.0 to 5.2	-33.0 to -38.2
					5.2 to 13.0	-38.2 to -46.0
C-3	33° 45.290'	118° 17.019'	-36.0	12.0	0.0 to 5.0	-36.0 to -41.0
					5.0 to 12.0	-41.0 to -48.0
C-4	33° 45.327'	118° 17.037'	-28.8	12.5	0.0 to 6.7	-28.8 to -35.5
					6.7 to 12.5	-35.5 to -41.3
C-5	33° 45.317'	118° 17.078'	-20.0	12.5	0.0 to 7.0	-20.0 to -27.0
					7.0 to 12.5	-27.0 to -32.5
C-6	33° 45.282'	118° 17.076'	-31.0	12.4	0.0 to 5.0	-31.0 to -36.0
					5.0 to 12.4	-36.0 to -43.4
C-7	33° 45.260'	118° 17.007'	-34.7	12.5	0.0 to 6.5	-34.7 to -41.2
					6.5 to 12.5	-41.2 to -47.2
C-8	33° 45.251'	118° 17.064'	-42.5	12.5	0.0 to 6.0	-42.5 to -48.5
					6.0 to 12.5	-48.5 to 55.0
C-9	33° 45.323'	118° 17.097'	-19.8	12.5	0.0 to 7.4	-19.8 to -27.2
					7.4 to 12.5	-27.2 to -32.3
Subunit D						
D-1	33° 45.305'	118° 17.110'	-21.3	7.5	0.0 to 7.5	-21.3 to -28.8
D-2	33° 45.278'	118° 17.143'	-21.2	7.4	0.0 to 7.4	-21.2 to -28.6
D-3	33° 45.288'	118° 17.198'	-18.8	7.5	0.0 to 7.5	-18.8 to -26.3
D-4	33° 45.253'	118° 17.216'	-12.5	7.5	0.0 to 7.5	-12.5 to -20.0
D-5	33° 45.267'	118° 17.275'	-1.3	7.5	0.0 to 7.5	-1.3 to -8.8
D-6	33° 45.281'	118° 17.318'	-1.3	5.9	0.0 to 5.9	-1.3 to -7.2
D-7	33° 45.239'	118° 17.131'	-48.0	7.0	0.0 to 7.0	-48.0 to -55.0
D-8	33° 45.306'	118° 17.144'	-17.0	7.6	0.0 to 7.6	-17.0 to -24.6
D-9	33° 45.289'	118° 17.228'	-15.8	7.6	0.0 to 7.6	-15.8 to -23.4
SW5	33° 45.211'	118° 16.817'	-16.0	3.0	0.0 to 3.0	-16.0 to -19.0

Table 2. Bulk Sediment Chemistry Results: Port of Los Angeles 2001 Deepening Program - Southwest Slip Project. Vibracore Samples. (Page 1 of 4)

Analytical Parameter	Comp A1 Top	Comp A1 Bot	Comp B Top	Comp B Bot	Comp C Top	Comp C Bot	Comp D	A1-1 Top	A1-1 Bot	A1-2 Top	A1-2 Bot	B1 Top	B1 Bot	B2 Top	B2 Bot	B3 Top	B3 Bot	B4 Top	B4 Bot	B5 Top	B5 Bot	B6 Top	B6 Bot	C1 Top	C1 Bot	C2 Top	C2 Bot	C3 Top	C3 Bot
GRAIN SIZE (% dry)																													
Sand/Gravel (>0.063 mm)	66.6	16.3	49.1	39.6	37.4	20.9	43.6	90.3	19.2	46.6	51.4	33.5	62.6	90.8	94.5	31.5	26.8	19.7	35.7	51.9	22.3	87.9	40.8	27.3	62.3	48.5	25.1	27.3	5.9
Silt (0.004 mm - 0.063 mm)	20.9	54.8	30.8	38.2	35.2	52.2	34.3	5.6	52.7	33.6	31.7	41.3	28.6	4.5	1.5	41.7	39.9	45.0	46.5	24.9	51.6	6.8	35.1	41.0	26.0	29.2	54.2	41.5	55.0
Clay (<0.004 mm)	12.5	29.0	20.1	22.2	27.4	26.9	22.1	4.1	28.1	19.7	16.9	25.3	8.8	4.8	4.0	26.8	33.3	35.2	17.8	23.2	26.1	5.3	24.1	31.7	11.7	22.4	20.7	31.2	39.0
SEDIMENT CONVENTIONALS																													
Ammonia (mg/Kg)	22	90	12	34	92	80	81	10U	86	33	87	17	10U	10U	10U	14	55	47	54	320	130	13	91	24	68	69	47	55	63
Total sulfides (mg/Kg, dry)	31	77	0.87	34	840	54	1100	3.6	0.87	73	0.33	80	0.12	0.18	0.1U	130	1.3	220	0.62	1100	180	260	71	210	4.1	1100	67.0	190	2.4
Total Volatile Solids (%)	1.5	2.1	2.3	2.1	4.2	2.7	4.1	1.7	2.2	2.0	1.6	2.9	1.1	0.55	0.43	3.2	2.6	3.1	1.7	5.2	3.60	1.30	2.90	4.10	2.70	3.20	2.2	4.50	2.70
Water soluble sulfides (mg/Kg, dry)	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.12	0.29	0.1U	0.1U	0.18	0.13	0.11	0.11	0.16	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.12	0.11	0.1U	0.1U
Oil and Grease (mg/Kg, dry)	480	160	690	100U	6000	1000	2600	190	100U	700	100	590	100U	100U	100U	1200	100U	810	100U	14000	1800	650	2000	1700	470	1800	560	2100	200
TRPH (mg/Kg, dry)	240	100U	280	100U	2100	440	970	160	100U	290	100U	270	100U	100U	100U	410	100U	400	100U	5500	670	300	980	810	220	820	190	720	150
% Solids (%)	74	71	65	74	53	66	61	75	73	70	72	61	74	84	88	59	69	56	71	53	61	77	68	52	65	59	72	54	66
TOC (%)	0.57	0.75	0.34	1.53	0.78	1.54	0.50	0.35	0.45	0.9	0.5	0.77	0.1U	0.1U	0.1U	1.18	0.52	1.28	0.38	2.52	1.17	0.42	1.17	1.67	0.83	1.34	0.55	1.68	0.67
METALS (mg/Kg, dry wt)																													
Arsenic	5.7	**9.8**	**9.2**	6.4	**16**	**11**	**11**	6.2	**9.7**	**8.4J**	**11J**	**12**	4.8	2.4	1.9	**16**	**9.7**	**13**	**9.7**	**31J**	**17J**	**9.5J**	**16J**	**17J**	**10J**	**19**	**9.1**	**18J**	**10J**
Cadmium	0.1U	0.1U	0.37	0.15	**2.3**	0.27	**2.6**	0.11	0.1U	0.24	0.15	0.44	0.1U	0.29	0.25	0.8	0.21	0.56	0.12	**5.7**	1	0.9	**1.40**	**3.9**	0.68	**2.5**	0.28	**2.7**	0.67
Chromium	12	19	31	19	**180**	28	**85**	26	30	53	52	48	25	15	18	66	42	66	34	**250**	78.0	**190**	**93**	**130**	71	**160**	37	**150**	57
Copper	8.5	14	**35**	10	**290**	**59**	**87**	16	18	28	22	**46**	16	5.3	6	**73**	26	**86**	23	**570**	**160**	**140**	**180**	**160**	**39**	**290**	**39**	**310**	**35**
Lead	18	16	**65**	12	**180**	**150**	**500**	18	13	**47**	17	**72**	13	16	2.2	**140**	18	**83**	13	**570**	**140**	**270**	**350**	**220**	34	**420**	**90**	**220**	28
Mercury	0.13	0.11	**0.81**	**0.2**	**3.3**	**6.5**	**0.47**	**0.18**	0.073	**0.34**	0.1	**0.81**	0.13	0.023	0.02U	**1.3**	**0.36**	**0.6**	0.061	**12**	**6.2**	**0.69**	**7.2**	**2.1**	**1.2**	**2.3**	**1.2**	**5**	**2.9**
Nickel	6.8	11	13	10	**80**	13	**30**	12	14	11	15	15	11	5	8.2	20	**25**	**23**	16	**34**	**25**	**53.0**	**25**	**32**	**21**	**43**	11	**39**	16
Selenium	0.13	0.22	0.26	0.17	0.42	0.23	0.42	0.16	0.19	0.16	0.16	0.32	0.1U	0.1U	0.1U	0.41	0.28	0.45	0.15	0.1U	0.14	0.1U	0.13	0.27	0.18	0.73	0.23	0.1	0.1U
Silver	0.1U	0.1U	0.14	0.1U	0.29	0.1U	0.18	0.1U	0.1U	0.10	0.1U	0.13	0.1U	0.1U	0.1U	0.19	0.1U	0.17	0.1U	0.50	0.23	0.1U	0.26	0.47	0.17	0.31	0.1U	0.24	0.15
Zinc	21	31	70	28	**270**	81	**300**	44	47	65	52	100	42	50	18	**220**	65	**160**	59	**740**	**190**	**270**	**330**	**280**	87	**1100**	76	**300**	76
ORGANOTINS (ppb, dry weight)																													
Dibutyltin	16	1U	32	1U	93	1U	78	1U	1.8	19	1U	38	1U	1U	1U	42	1U	71	1U	41	1U	29	1U	42	1U	130	17	35	1U
Monobutyltin	1U	1U	6.5	5.8	11	1U	11	1.7	1U	1U	1U	1.9	1U	1U	1U	3.7	1U	4.1	1U	3	1U	1U	1U	1U	1U	5.4	2.4	1U	1U
Tetrabutyltin	1U	1U	1U	1U	1U	1U	1U	2.3	1U	1U	1U	1U	1U	1U	1U	2	1.9	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U
Tributyltin	13	1U	5.8	1U	68	1U	69	1U	3.6	7.4	1U	23	1U	1.6	1U	13	2.1	55	1U	16	2.1	16	1U	13	1U	72	7.7	22	1U
CHLORINATED PESTICIDES (ppb, dry weight)																													
Aldrin	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	1.9U	1.6U	1.3U	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
alpha-BHC	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	1.9U	1.6U	1.3U	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
beta-BHC	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	5.7	1.4U	1.9U	1.6U	8.1	1.5U	1.9U	1.5U	1.7U	4	1.8U	1.5U
delta-BHC	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	1.9U	1.6U	1.3U	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
gamma-BHC (lindane)	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	1.9U	1.6U	1.3U	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
alpha-Chlordane	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	1.9U	1.6U	14	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
gamma-Chlordane	1.3U	1.4U	1.5U	1.4U	7.6	1.5U	15	1.3U	1.4U	1.4U	1.4U	1.6	1.4U	1.2U	1.1U	2.5	1.4U	1.8U	1.4U	6.4	1.6U	1.3U	1.5U	9.2	1.5U	9.6	1.4U	13	1.5U
4,4'-DDD	2.6	1.4U	4.3	1.4U	53	1.5U	2300	1.3U	1.4U	5.8	1.4U	6.9	2.3	1.2U	1.1U	11	1.4U	3.6	1.4U	41	5.4	14	6.8	27	7.7	25	1.4U	31	1.5U
4,4'-DDE	**16**	1.4U	**32**	1.4U	**250**	**6.5**	**2100**	**2.3**	1.4U	**38**	1.4U	**47**	**20**	1.2U	1.1U	**73**	1.4U	**15**	1.4U	**410**	**25**	**33**	**53**	**110**	**130**	**110**	**9.3**	**110**	1.5U
4,4'-DDT	1.3U	1.4U	1.5U	1.4U	25	1.5U	110	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	23	1.6U	1.3U	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
Total DDTs	**18.6**	1.4U	**36.3**	1.4U	**328**	**6.5**	**4510**	**2.3**	1.4U	**43.8**	1.4U	**53.9**	**22.3**	1.2U	1.1U	**84**	1.4U	**18.6**	1.4U	**474**	**30.4**	**47**	**59.8**	**137**	**137.7**	**135**	**9.3**	**141**	1.5U

Bold values equal or exceed the ERL.

Bold and underlined values equal or exceed the ERM.

Boxed values equal or exceed the San Francisco Bay Threshold.

Comp C contains cores B5 and B6

"U" Qualifier denotes analyte not detected at method detection limit

"U*" Qualifier denotes reporting limit raised due to matrix interference

" J " Qualifier denotes analyte concentration reported as an estimate.

Table 2. Bulk Sediment Chemistry Results: Port of Los Angeles 2001 Deepening Program - Southwest Slip Project. Vibracore Samples. (Page 2 of 4)

Analytical Parameter	Comp A1 Top	Comp A1 Bot	Comp B Top	Comp B Bot	Comp C Top	Comp C Bot	Comp D	A1-1 Top	A1-1 Bot	A1-2 Top	A1-2 Bot	B1 Top	B1 Bot	B2 Top	B2 Bot	B3 Top	B3 Bot	B4 Top	B4 Bot	B5 Top	B5 Bot	B6 Top	B6 Bot	C1 Top	C1 Bot	C2 Top	C2 Bot	C3 Top	C3 Bot
CHLORINATED PESTICIDES (Continued)																													
Dieldrin	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	10	1.4U	1.8U	1.4U	64	1.6U	1.3U	1.5U	1.9U	1.5U	20	1.4U	14	1.5U
Endosulfan I	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	1.9U	1.6U	1.3U	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
Endosulfan II	1.3U	1.4U	3.5	1.4U	27	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	48	1.4U	1.8U	1.4U	89	1.6U	7.3	1.5	18	1.7	66	1.4U	31	1.5U
Endosulfan sulfate	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	1.9U	1.6U	1.3U	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
Endrin	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	1.9U	1.6U	1.3U	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
Endrin Aldehyde	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	61	1.4U	1.8U	1.4U	1.9U	1.6U	1.3U	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
Endrin Ketone	1.3U	1.4U	1.5U	1.4U	2.3	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	1.9U	8.1	2	1.5U	1.9U	1.5U	1.7U	1.4U	9.4	1.5U
Heptachlor	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	1.6U	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	3	1.6U	2	1.5U	1.9U	1.5U	1.7U	1.4U	3.1	1.5U
Heptachlor epoxide	1.3U	1.4U	1.5U	1.4U	1.9U	1.5U	4.1	1.3U	1.4U	1.4U	1.4U	1.6U	1.4U	1.2U	1.1U	1.7U	1.4U	1.8U	1.4U	1.9U	1.6U	1.3U	1.5U	1.9U	1.5U	1.7U	1.4U	1.8U	1.5U
Toxaphene	13U	14U	15U	14U	19U	15U	16U	13U	14U	14U	14U	16U	14U	12U	11U	17U	14U	18U	14U	19U	16U	13U	15U	19U	15U	17U	14U	18U	15U
Methoxychor	2.7U	2.8U	3.1U	2.7U	3.8U	3.0U	3.3U	2.7U	2.8U	2.8U	2.8U	3.3U	2.7U	2.4U	2.3U	3.4U	2.9U	3.6U	2.8U	3.8U	3.3U	2.6U	2.9U	3.9U	3.1U	3.4U	2.8U	3.7U	3.0U
PCBs (ppb, dry weight)																													
PCB 1242	6.7U	7U	7.7U	6.8U	9.5U	7.5U	8.2U	6.7U	6.9U	7.1U	6.9U	8.2U	6.8U	5.9U	5.7U	8.5U	7.2U	9.0U	7.1U	9.4U	8.2U	6.5U	7.4U	9.6U	7.7U	8.4U	7.0U	9.2U	7.6U
PCB 1248	6.7U	7U	7.7U	6.8U	9.5U	7.5U	8.2U	6.7U	6.9U	7.1U	6.9U	8.2U	6.8U	5.9U	5.7U	8.5U	7.2U	9.0U	7.1U	9.4U	8.2U	6.5U	7.4U	9.6U	7.7U	8.4U	7.0U	9.2U	7.6U
PCB 1254	34	7U	180	13	1100	44	310	6.7U	6.9U	68	6.9U	210	300	5.9U	5.7U	8.5U	7.2U	95	7.1U	5100	140	630	110	520	130	1300	18	1500	7.6U
PCB 1260	6.7U	7U	7.7U	6.8U	9.5U	7.5U	8.2U	6.7U	6.9U	7.1U	6.9U	8.2U	6.8U	5.9U	5.7U	1900	7.2U	9.0U	7.1U	9.4U	8.2U	6.5U	7.4U	9.6U	7.7U	8.4U	7.0U	9.2U	7.6U
Total PCBs	**34**	7U	**180**	13	**1100**	**44**	**310**	6.7U	6.9U	**68**	6.9U	**210**	**300**	5.9U	5.7U	**1900**	7.2U	**95**	7.1U	**5100**	**140**	**630**	**110**	**520**	**130**	**1300**	18	**1500**	7.6U
SEMI-VOLATILES (ppb, dry wt)																													
Naphthalene	6.7U	7U	7.7U	6.8U	80	**1100**	**3600**	6.7U	6.9U	7.7	6.9U	8.2U	6.8U	5.9U	5.7U	8.8	7.2U	9U	7.1U	**180**	**660**	10	**280**	19U*	7.7U	44	7U	**160**	7.6U
Acenaphthylene	13	7U	37	6.8U	**120**	20	41U	6.7U	6.9U	17	6.9U	28	6.8U	5.9U	5.7U	**65**	7.2U	**100**	7.1U	19U*	41U*	34	22U*	56	7.7U	37	7U	43	7.6U
Acenaphthene	6.7U	7U	8.4	6.8U	510	240	960	6.7U	6.9U	7.1U	6.9U	8.2U	6.8U	5.9U	5.7U	9.9	7.2U	12	7.1U	470	150	11	91	21	7.7U	49	7U	96	7.6U
Fluorene	6.7U	7U	**21**	6.8U	**440**	**230**	**960**	7.2	6.9U	12	6.9U	18	6.8U	5.9U	5.7U	**31**	7.2U	**52**	7.1U	**550**	**210**	**23**	37U*	**44**	7.7U	**89**	7U	**180**	7.6U
Phenanthrene	27	7U	120	6.8U	**1900**	**860**	**2300**	23	6.9U	48	6.9U	82	14U*	5.9U	5.7U	190	7.2U	220	7.1U	**3200**	**630**	140	**540**	**270**	17	**660**	26	**1000**	7.6U
Anthracene	24	7U	**87**	6.8U	**1600**	**330**	**590**	24	6.9U	48	6.9U	55	6.8U	5.9U	5.7U	**150**	7.2U	**270**	7.1U	**2300**	**460**	**120**	**320**	**170**	13	**290**	19	**240**	7.6U
Fluoranthene	59	7U	230	6.8U	**9700**	**1500**	**1600**	52	6.9U	120	6.9U	160	8.2	5.9U	5.7U	340	7.2U	290	7.1U	**9800**	**2000**	290	**1300**	**710**	36	**1400**	79	**1300**	7.6U
Pyrene	110	11	370	6.8U	**8500**	**1300**	**2000**	120	6.9U	260	12	160	14U*	5.9U	5.7U	390	7.2U	**1400**	7.1U	**13000**	**2100**	**2500**	**1100**	**1000**	150	**1900**	260	**1800**	38
Benzo(a)anthracene	59	7U	230	6.8U	**4700**	**500**	**540**	48	6.9U	120	6.9U	140	14U*	5.9U	5.7U	**410**	7.2U	**660**	7.1U	**4900**	**990**	**360**	**680**	**540**	31U*	**780**	21U*	**780**	7.6U
Chrysene	100	14U*	**400**	6.8U	**6100**	**600**	**710**	89	6.9U	210	14U*	240	20U*	5.9U	5.7U	**710**	7.2U	**2000**	7.1U	**6000**	**1500**	**890**	**870**	**850**	34	**1200**	74	**1100**	15U*
Benzo(b)fluoranthene	230	14U*	1400	14U*	11000	450	730	120	6.9U	440	15	1000	50	6.1	5.7U	2000	9.7	4100	7.1U	4300	970	1800	520	2300	54	2700	120	2000	15U*
Benzo(k)fluoranthene	200	14U*	800	14U*	12000	350	610	80	6.9U	270	15	590	28	5.9U	5.7U	1700	7.9	2900	7.1U	6800	710	2100	770	2500	40	2000	96	2000	15U*
Benzo(a)pyrene	180	14U*	**1200**	14U*	**5300**	**450**	**590**	98	6.9U	330	21U*	**800**	31	5.9U	5.7U	**2000**	7.2U	**2900**	17	**5700**	**840**	**1300**	290	**2100**	48	**2400**	130	**1800**	43
Indeno[1,2,3-CD]pyrene	27U*	14U*	520	14U*	2100	200	330	43	6.9U	160	28U*	340	27U*	12U	11U	950	14U	1300	14U	38U*	82U*	680	44U*	960	31	1000	58	850	23U*
Dibenzo(a,h)anthracene	27U*	14U*	**280**	14U*	**610**	60U	49U*	40U*	6.9U	57U*	28U*	**110**	27U*	12U	11U	**420**	14U	**560**	14U	**1200**	**100**	**290**	**78**	**420**	15U	67U*	28U*	**390**	23U*
Benzo[ghi]perylene	27U*	14U*	240	14U*	340	93	99U*	50	6.9U	57U*	28U*	290	20U*	12U*	5.7U	410	23	270	14U*	19U*	99U*	39U*	44U*	67U*	15U*	220	70	130	23U*
Benzo(e)pyrene	150U*	14U*	780	14U*	2700	350	450	87	6.9U	260	21U*	510	20U*	5.9U	5.7U	1300	13	2000	27	4300	630	770	240	1100	42	1500	130	1100	64
Total detectable PAHs	1200	11	**6700**	14U*	**68000**	**8600**	**16000**	840	6.9U	2300	42	**4500**	120	6.1	5.7U	**11000**	54	**19000**	44	**63000**	**12000**	**12000**	**7100**	**13000**	470	**16000**	1100	**15000**	150
Total Phthalates	280	160	510	220	770	350	630	190	21	630	210	180	88	120	29	400	160	160	98	1200	100	190	210	1000	190	130	40	500	130
Total Phenols	100	14	300	23	130	38	810	42	18	180	14U	31	14U	12	11U	44	29	68	18	120	680	23	220	170	62	17U	24	22	26

Bold values equal or exceed the ERL.

Bold and underlined values equal or exceed the ERM.

Boxed values equal or exceed the San Francisco Bay Threshold.

Comp C contains cores B5 and B6

"U" Qualifier denotes analyte not detected at method detection limit

"U*" Qualifier denotes reporting limit raised due to matrix interference

Table 2. Bulk Sediment Chemistry Results: Port of Los Angeles 2001 Deepening Program - Southwest Slip Project. Vibracore Samples. (Page 3 of 4)

Analytical Parameter	C4 Top	C4 Bot	C5 Top	C5 Bot	C6 Top	C6 Bot	C7 Top	C7 Bot	C8 Top	C8 Bot	C9 Top	C9 Bot	D1	D2	D3	D4	D5	D6	D7	D8	D9	ER-L 1995 (dry wt)	ER-M 1995 (dry wt)	Title 22 (wet wt)
GRAIN SIZE (% dry)																								
Sand/Gravel (>0.063 mm)	21.0	18.8	25.8	51.6	17.3	8.3	20.8	13.3	79.0	12.6	13.9	42.4	19.6	4.7	28.8	70.0	89.5	66.6	24.5	54.3	32.9			
Silt (0.004 mm - 0.063 mm)	43.2	49.8	44.1	37.7	50.8	56.3	48.3	64.1	13.4	53.3	48.4	42.6	42.3	58.5	40.0	19.0	6.6	22.2	38.5	25.3	30.9			
Clay (<0.004 mm)	35.7	31.3	30.1	10.7	31.9	35.4	30.8	22.6	7.6	34.0	37.7	15.0	38.1	36.8	31.2	10.9	3.9	11.2	36.9	20.4	36.2			
SEDIMENT CONVENTIONALS																								
Ammonia (mg/Kg)	79	78	94	34	22	68	70	68	58	86	220	57	77	160	70	58	92	10U	110	57	250			
Total sulfides (mg/Kg, dry)	500	1.6	930	10.0	110	5.6	660	79	1100	20	1000	1.5	200	570	260	460	290.0	81	1200	690	2900			
Total Volatile Solids (%)	5.0	1.8	3.8	0.97	4.6	3.0	4.5	2.6	3.0	2.5	4.4	1.6	2.9	4.5	3.8	3.3	4.1	1.5	4.2	2.3	12			
Water soluble sulfides (mg/Kg, dry)	0.17	0.11	0.18	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.49	0.1U	0.1U	0.13	0.1U	0.1U	0.1U	0.1U	0.13			
Oil and Grease (mg/Kg, dry)	1900	170	3600	310	1000	170	2000	770	2000	960	3800	760	1700	1900	1900	1200	2000	1200	1500	1700	20000			
TRPH (mg/Kg, dry)	480	100U	810	100U	430	100U	720	330	640	380	1200	560	1100	1300	540	710	540	430	790	880	4600			
% Solids (%)	48	69	49	73	56	66	53	68	66	66	46	68	58	49	57	63	60	79	48	63	40			
TOC (%)	1.89	0.58	0.51	1.27	1.42	0.6	1.53	0.48	1.03	0.85	1.79	0.51	1.05	1.53	1.55	2.34	2.00	0.41	1.9	1.09	8.75			
METALS (mg/Kg, dry wt)																								
Arsenic	**19**	**8.7**	**20**	5.8	**9.8J**	**8.2J**	**15J**	**19J**	**12J**	**14J**	**19J**	6.3J	**13J**	**21J**	**14**	4.8J	7	4.7	**22J**	**16J**	**14J**	8.2	70.00	500
Cadmium	**2.3**	0.19	**2.2**	0.25	**2.4**	0.53	**3.7**	1.1	**1.3**	0.87	**8.4**	0.69	1.1	**39**	**4.2**	**4.1**	**2.5**	1.1	**22**	**10**	**23**	1.2	9.60	100
Chromium	80	39	**100**	18	**88**	58	**200**	55	**800**	72	**140**	39	74	**190**	**83**	48	49	25	**210**	**420**	**110**	81	370.0	2500
Copper	**100**	21	**160**	12	**110**	**37**	**280**	**240**	**750**	**130**	**270**	**71**	**130**	**240**	**70**	32	**35**	11	**1300**	**560**	**1100**	34.0	270.00	2500
Lead	**190**	22	**270**	**52**	**96**	17	**210**	**260**	**2200**	**140**	**280**	**56**	**160**	**250**	**140**	**54**	**97**	**190**	**77**	**330**	**1100**	47	218.00	1000
Mercury	**1.9**	**0.19**	**6.5**	**0.25**	**2.0**	**0.43**	**3.5**	**16**	**1.9**	**3.7**	**4.8**	**0.99**	**2.9**	**1.5**	**0.81**	**0.56**	**0.2**	0.1	**1.6**	**3**	**5.7**	0.15	0.71	20
Nickel	**23**	14	**25**	7	**30**	19	**67**	**21**	**370**	20	**43**	15	20	**50**	**25**	**23**	**26**	**14**	**3200**	**130**	**62**	20.9	51.60	2000
Selenium	0.59	0.25	0.64	0.12	0.1U	0.1U	0.16	0.1U	0.1U	0.1U	0.17	0.12	0.21	0.31	0.55	0.29	0.74	0.32	0.25	0.1U	0.15			100
Silver	0.22	0.1U	0.21	0.1U	0.27	0.11	0.41	0.17	0.22	0.15	0.58	0.10	0.1U	0.58	0.19	0.15	0.1U	0.1U	**41**	0.36	0.46	1.00	3.70	500
Zinc	**230**	58	**270**	41	**160**	70	**340**	**240**	**1500**	**150**	**310**	100	140	**270**	**160**	97	120	45	**490**	**570**	**4600**	150.0	410.0	5000
ORGANOTINS (ppb, dry weight)																								
Dibutyltin	170	1U	130	1U	19	1U	62	1U	140	4.7	10	1U	1U	7.8	41	17	1U	2	70	150	5.8			
Monobutyltin	7.5	1U	7.2	1U	1U	1U	2.5	1U	1U	1U	1U	1U	1U	1U	3.4	1U	1U	1.9	1U	10.0	1U			
Tetrabutyltin	2.2	1.5	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U			
Tributyltin	88	1U	57	2.2	5.8	1U	26	1U	110	1U	1U	1U	1U	1U	12	3	1U	1.3	77	92	1U			
CHLORINATED PESTICIDES (ppb, dry weight)																								
Aldrin	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9U	1.5U	7.6U	1.5U	2.2U	1.5U	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	1.6U	25U			
alpha-BHC	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9U	1.5U	7.6U	1.5U	2.2U	1.5U	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	1.6U	33			
beta-BHC	13	1.5U	20	1.4U	8.2	1.5U	1.9U	2.4	7.6U	2.3	12	2.2	2.4	9.5	11	6.8	10	1.3U	2.1U	1.6U	25U			
delta-BHC	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9U	1.5U	7.6U	1.5U	2.2U	1.5U	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	4.5	25U			
gamma-BHC (lindane)	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9U	1.5U	7.6U	1.5U	2.2U	1.5U	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	1.6U	25U			
alpha-Chlordane	2.1U	1.5U	9	1.4U	13	1.5U	29	1.5U	7.6U	1.5U	12	1.5U	3.3	2.0U	9.9	14	28	11	2.1U	1.6U	25U			
gamma-Chlordane	2.1U	1.5U	2.1U	1.4U	6.6	1.5U	9.3	1.5U	7.6U	1.5U	2.2U	1.5U	1.7U	61	7.9	16	1.7U	6.5	54	9.4	25U			
4,4'-DDD	98	1.5U	150	1.4U	14	1.5U	30	4	36	1.5U	150	2.2	140	190	18	7.1	32	16	13	46	13000			
4,4'-DDE	**86**	1.5U	**620**	1.4U	**43**	1.5U	**130**	**66**	**61**	**4.3**	**330**	**5.4**	**470**	**400**	**37**	**17**	**35**	**7.6**	**69**	**99**	**33000**	2.2	27	
4,4'-DDT	2.1U	1.5U	53	1.4U	3.5	1.5U	17	1.5U	17	1.8	81	1.5U	380	160	3.9	2.4	10	1.3U	2.1U	24	2400			
Total DDTs	**184**	1.5U	**823**	1.4U	**60.5**	1.5U	**177**	**70**	**114**	**6.1**	**561**	**7.6**	**990**	**750**	**58.9**	**26.5**	**77**	**23.6**	**82**	**169**	**48400**	1.58	46.1	1000

Bold values equal or exceed the ERL.

Bold and underlined values equal or exceed the ERM.

Boxed values equal or exceed the San Francisco Bay Threshold.

Comp C contains cores B5 and B6

"U" Qualifier denotes analyte not detected at method detection limit

"U*" Qualifier denotes reporting limit raised due to matrix interference

" J " Qualifier denotes analyte concentration reported as an estimate

Table 2. Bulk Sediment Chemistry Results: Port of Los Angeles 2001 Deepening Program - Southwest Slip Project. Vibracore Samples. (Page 4 of 4)

Analytical Parameter	C4 Top	C4 Bot	C5 Top	C5 Bot	C6 Top	C6 Bot	C7 Top	C7 Bot	C8 Top	C8 Bot	C9 Top	C9 Bot	D1	D2	D3	D4	D5	D6	D7	D8	D9	ER-L 1995 (dry wt)	ER-M 1995 (dry wt)	Title 22 (wet wt)
CHLORINATED PESTICIDES (Continued)																								
Dieldrin	3.1	1.5U	5.8	1.4U	1.8U	1.5U	2.7	1.5U	7.6U	1.5U	2.2U	1.5D	6.6	10	1.8U	6.2	1.7U	2	8.6	16	25U			
Endosulfan I	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9U	1.5U	7.6U	1.5U	2.2U	1.5D	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	1.6U	25U			
Endosulfan II	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	42	1.5U	24	1.5U	2.2U	1.5D	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	43	25U			
Endosulfan sulfate	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9U	1.5U	7.6U	1.5U	2.2U	2.2U	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	1.6U	25U			
Endrin	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9U	1.5U	7.6U	1.5U	2.2U	1.5U	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	1.6U	25U			
Endrin Aldehyde	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9U	12	7.6U	1.5U	2.2U	1.5U	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	1.6U	25U			
Endrin Ketone	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9U	1.5U	7.6U	1.5U	2.2U	1.5U	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	6.2	25U			
Heptachlor	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9	1.9	7.6U	1.5U	2.2U	1.5U	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	1.7	25U			
Heptachlor epoxide	2.1U	1.5U	2.1U	1.4U	1.8U	1.5U	1.9U	1.5U	7.6U	1.5U	2.2U	1.5U	1.7U	2.0U	1.8U	1.6U	1.7U	1.3U	2.1U	1.6U	25U			
Toxaphene	21U	15U	21U	14U	18U	15U	19U	15U	76U	15U	22U	15U	17U	20U	18U	16U	17U	13U	21U	16U	250U			
Methoxychor	4.2U	2.9U	4.1U	2.7U	3.5U	3.0U	3.8U	3.0U	15U	3.0U	4.4U	2.9U	1.7U	13	3.5U	3.2U	3.3U	2.5U	4.2U	3.2U	50U			
PCBs (ppb, dry weight)																								
PCB 1242	10U	7.3U	10U	6.9U	8.9U	7.6U	9.5U	7.4U	38U	7.6U	11U	7.3U	8.6U	10U	8.8U	7.9U	8.4U	6.3U	10U	8U	130U			
PCB 1248	10U	7.3U	10U	6.9U	8.9U	7.6U	9.5U	7.4U	38U	7.6U	11U	7.3U	8.6U	10U	8.8U	7.9U	8.4U	6.3U	10U	8U	130U			
PCB 1254	310	7.3U	720	6.9U	150	7.6U	1100	47	800	73	1100	33	190	1100	120	67	8.4U	35	860	1900	8000			
PCB 1260	10U	7.3U	10U	6.9U	8.9U	7.6U	9.5U	7.4U	38U	7.6U	11U	7.3U	8.6U	10U	8.8U	7.9U	270	6.3U	10U	8U	130U			
Total PCBs	**310**	7.3U	**720**	6.9U	**150**	7.6U	**1100**	**47**	**800**	**73**	**1100**	**33**	**190**	**1100**	**120**	**67**	**270**	**35**	**860**	**1900**	**8000**	22.7	180	50000
SEMI-VOLATILES (ppb, dry wt)																								
Naphthalene	20	7.3U	13	6.9U	8.9U	7.6U	19	380	62	3000	24	7.3U	8.6U	11	19	7.9U	9.9	6.3U	130	43	130000	160	2100	
Acenaphthylene	90	7.3U	47	6.9U	25	7.6U	76	15U*	260	17	65U*	22U*	34U*	32	21	7.9U	8.4U	6.3U	75	52	63U*	44	640	
Acenaphthene	31U*	7.3U	20	6.9U	8.9U	7.6U	51	180	1200	520	65U*	26	34U*	28	18U*	7.9U	13	6.3U	150	190	30000			
Fluorene	59	7.3U	10U	15	18	7.6U	76	210	910	400	76U*	48	43U*	51	33	11	38	9.6	190	190	25000	19	540	
Phenanthrene	330	16	180	45	130	7.6U	550	660	2900	1200	330	140	72	220	170	130	220	23	1200	990	80000	240	1500	
Anthracene	230	7.3U	190	22	69	7.6U	270	130	3200	530	280	81U*	69U*	120	79	35	67	13U	540	410	11000	85.3	1100	
Fluoranthene	650	19	600	90	410	7.6U	970	610	13000	2300	1100	340	260	630	490	270	470	56	2300	2200	28000	600	5100	
Pyrene	1300	39	4100	130	550	7.6U	2300	830	11000	1800	3500	470	1200	1800	900	510	640	140	4000	5100	25000	665	2600	
Benzo(a)anthracene	610	22U*	560	44	320	7.6U	1500	250	7400	690	720	130	260	450	330	140	230	29	1200	1200	4500	261	1600	
Chrysene	1000	22U*	740	63	510	7.6U	110U*	59U*	11000	870	940	160	310	490	440	250	350	52	2100	1700	4500	384	2800	
Benzo(b)fluoranthene	2300	53	1300	44	890	7.6U	3600	44U*	14000	53U*	1300	150	480	1100	880	320	330	67	2500	3000	2300			
Benzo(k)fluoranthene	2300	32	970	33	740	7.6U	130U*	44U*	11000	380	1000	100	400	530	560	220	230	44U*	2300	2500	1600			
Benzo(a)pyrene	2500	29U*	1200	27U*	830	15U*	1700	250	11000	520	1400	120	450	890	670	250	150U*	57U*	2500	3000	1900	430	1600	
Indeno[1,2,3-CD]pyrene	1100	29U*	530	27U*	390	15U	910	44U*	5600	300	110U*	51U*	260	550	280	140	100U*	38U*	1100	1600	1000			
Dibenzo(a,h)anthracene	540	29U*	21U	27U*	130	15U	340	52U*	1200	130	130U*	51U*	78U*	280	70U*	48U*	100U*	51U*	420	510	880	63.4	260	
Benzo[ghi]perylene	500	36U*	390	34U*	340	15U*	95U*	52U*	4800	180	350	80U*	110	470	150	190	130U*	44U*	980	1200	140U*			
Benzo(e)pyrene	1900	42	880	34U*	710	9.4	950	270	8300	440	1100	98	400	790	550	220	230	44U*	1800	2100	1300			
Total detectable PAHs	**15000**	200	**12000**	490	**6100**	9.4	**13000**	3800	**110000**	**13000**	**12000**	1800	**4200**	**8400**	**5600**	2700	2800	380	**24000**	**24585**	**350000**	4022	44792	
Total Phthalates	960	140	460	180	1300	130	19U	44	930	59	240	78	330	750	1000	1300	2600	380	3400	778	280	1700	9600	
Total Phenols	36	90	35	26	120	29	180	110	65	52	940	370	330	26	290	83	69	93	61	90	46000			

Bold values equal or exceed the ERL.

Bold and underlined values equal or exceed the ERM.

Boxed values equal or exceed the San Francisco Bay Threshold.

Comp C contains cores B5 and B6

"U" Qualifier denotes analyte not detected at method detection limit

"U*" Qualifier denotes reporting limit raised due to matrix interference

Table 3. Elutriate Chemistry Results: Port of Los Angeles - Southwest Slip Project . (Page 1 of 2)

Analytical Parameter	A Top Comp	A Bot Comp	B Top Comp	B Bot Comp	C Top Comp	C Bot Comp	D Comp	ABCD Comp (Salt Water)	WQS Salt Water Max EPA 2000	WQS Salt Water Cont EPA 2000
CONVENTIONALS										
Ammonia (mg/L)	4.4	11	2.4	6.5	5.6	11	6.4	0.1U		
Water soluble sulfides (mg/L)	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U		
Oil and Grease (mg/L)	5U	5U	5U	5U	5U	5U	5U	5U		
METALS (µg/L, wet wt)										
Arsenic	6.5	12	5.9	3.7	12	8.2	9.1	1.0	69	36
Cadmium	0.1U	0.15	0.18	0.56	0.7	0.26	0.59	1.1	42	9.3
Chromium	17	23	17	21	19	19	17	19	1100	50
Copper	2.8	**7.0**	**3.8**	**3.5**	3.4	1.5	**2.6**	**3.1**	4.8	3.1
Lead	1U	2.1	1U	1U	2.0	1U	1U	1U	210	8.1
Mercury	**0.045**	**0.071**	**0.077**	**0.042**	**0.076**	0.01U	**0.16**	**0.076**	0.16(a)	0.04 (b)
Nickel	4.1	6.7	4.4	7	3.4	3.0	3.8	**8.4**	74.0	8.2
Selenium	1U	1U	1U	1	1U	1U	1U	1U	290	71
Silver	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	1.90	
Zinc	5U	9.9	7.6	16	7.9	8	8.6	12	90	81
ORGANOTINS (ppt (ng/L) wet weight)										
Dibutyltin	2U	2U	2U	2U	2U	2U	4.9	7.2		
Monobutyltin	2UR	2UR	2UR	2UR	2UR	2UR	2UR	2UR		
Tetrabutyltin	2U	2U	2U	2U	2U	2.2	2U	2U		
Tributyltin	49.0	2U	2U	2U	10.0	2U	3.1	2U		
CHLORINATED PESTICIDES (ppb, wet weight)										
Aldrin	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	1.3	
alpha-BHC	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U		
beta-BHC	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U		
delta-BHC	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U		
gamma-BHC (lindane)	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.16	
alpha-Chlordane	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.09	0.004
gamma-Chlordane	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.09	0.004
4,4'-DDD	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.031	0.02U		
4,4'-DDE	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.022	0.02U		
4,4'-DDT	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.13	0.001
Total DDTs	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.053	0.02U		

a. Mercury values not established under the California Toxics Rule. Value is the daily maximum from the 1997 Ocean Plan.

b. Mercury values not established under the California Toxics Rule. Value is the 6-month median from the 1997 Ocean Plan.

Bolded values equal or exceed the maximun 4 day average Water Quality Standard

Bolded and underlined values exceed the maximum 1 hour average Water Quality Standard

"U" Qualifier denotes analyte not detected at method detection limit

" U* " Qualifier denotes reporting limit raised due to matrix interference

Table 3. Elutriate Chemistry Results: Port of Los Angeles - Southwest Slip Project . (Page 2 of 2)

Analytical Parameter	A Top Comp	A Bot Comp	B Top Comp	B Bot Comp	C Top Comp	C Bot Comp	D Comp	ABCD Comp (Salt Water)	WQS Salt Water Max EPA 2000	WQS Salt Water Cont EPA 2000
CHLORINATED PESTICIDES (Continued)										
Dieldrin	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.71	0.0019
Endosulfan I	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.034	0.0087
Endosulfan II	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.034	0.0087
Endosulfan sulfate	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U		
Endrin	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.037	0.0023
Endrin Aldehyde	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U		
Endrin Ketone	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U		
Heptachlor	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U		
Heptachlor epoxide	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U		
Toxaphene	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U		
Methoxychor	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U		
PCBs (ppb, wet weight)										
PCB 1242	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U		
PCB 1248	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U		
PCB 1254	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U		
PCB 1260	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U		
Total PCBs	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U		0.03
SEMI-VOLATILES (ppb, wet wt)										
Naphthalene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	15	0.1U		
Acenaphthylene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.3U*	0.1U		
Acenaphthene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.77	0.1U		
Fluorene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.6	0.1U		
Phenanthrene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.66	0.1U		
Anthracene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U		
Fluoranthene	0.1U	0.1U	0.1U	0.1U	0.2	0.1	0.14	0.1U		
Pyrene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.21	0.1U		
Benzo(a)anthracene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U		
Chrysene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U		
Benzo(b)fluoranthene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U		
Benzo(k)fluoranthene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U		
Benzo(a)pyrene	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U		
Indeno[1,2,3-CD]pyrene	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U		
Dibenzo(a,h)anthracene	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U		
Benzo[ghi]perylene	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U		
Total detectable PAHs	0.1U	0.1U	0.1U	0.1U	0.2	0.1	**17.38**	0.1U		15
Total Phenols	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U		

Bolded values equal or exceed the maximun 4 day average Water Quality Standard

Bolded and underlined values exceed the maximum 1 hour average Water Quality Standard

"U" Qualifier denotes analyte not detected at method detection limit

" U* " Qualifier denotes reporting limit raised due to matrix interference

Table 4. Port of Los Angeles 2001 Deepening Program - Southwest Slip Project. Toxicity Results.

	SOUTHWEST BASIN 2001									
	A1 TOP	A1 BOT	B TOP	B BOT	C TOP	C BOT	D	LA2 REF	LA3 REF	CONTROL
Water Column Bioassays (LC50 / EC50)										
Mytilus Survival	70.6%	22.7%	>100%	>100%	NT	20.6%	NT	NA	NA	>100%
Mytilus Development	71.5%	22.6%	>100%	>100%	NT	21.9%	NT	NA	NA	>100%
Mysidopsis Survival	>100%	>100%	>100%	>100%	NT	>100%	NT	NA	NA	>100%
Menidia Survival	>100%	>100%	>100%	>100%	NT	>100%	NT	NA	NA	>100%
Benthic Bioassays (% Survival)										
Rhepoxynius	86%	**43%**	83%	77%	NT	94%	NT	96%	76%	98%
Eohaustorius	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Ampelisca	96%	98%	95%	95%	NT	92%	NT	97%	98%	98%
Nephtys	100%	86%	94%	86%	NT	86%	NT	100%	98%	98%
Mysidopsis	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Bolded values indicate toxicity exceeding Limiting Permissible Concentration (LPC) at LA2.

Bolded and underlined values indicate toxicity exceeding Limiting Permissible Concentration (LPC) at LA2 and LA3.

NT = Not tested in this program.

NA = Not applicable - references not tested in water column bioassays.

Table 5. Mean Concentration of Detected Contaminants - *Macoma nasuta* Bioaccumulation

	SOUTHWEST BASIN 2001			
Analytical Parameter	B TOP	B BOT	LA2	LA3
METALS (mg/Kg, dry wt)				
Arsenic	23.6	25.8	25.4	23.4
Chromium	3.92	**5.02**	2.74	1.84
Copper	15.8	13.4	14.0	12.8
Lead	**4.90**	1.48	2.24	1.36
Nickel	**5.56**	**7.10**	3.54	2.86
Selenium	1.36	1.38	1.56	1.44
Zinc	**99.8**	83.0	95.4	78.4
SEMI-VOLATILES (ppb, dry wt)				
Fluoranthene	**116.2**	ND	44.2[a]	46.4[a]
Pyrene	**432**	ND	44.2[a]	46.4[a]
Chrysene	86.6	ND	44.2[a]	46.4[a]
Perylene	**104.2**	ND	44.2[a]	46.4[a]
Benzo(b)fluoranthene	**1680**	ND	44.2[a]	46.4[a]
Benzo(k)fluoranthene	**1256**	ND	44.2[a]	46.4[a]
Benzo(a)pyrene	**1096**	ND	44.2[a]	46.4[a]
Indeno[1,2,3-CD]pyrene	**168**	ND	87[a]	93[a]
Benzo[ghi]perylene	**158**	ND	44.2[a]	46.4[a]
Total detectable PAHs	**5950**	ND	44.2[a]	46.4[a]
CHLORINATED PESTICIDES (ppb, dry weight)				
DDE	**78.0**	ND	45.4	35.6
PCBs (ppb, dry weight)				
Aroclor 1254	**366**	ND	44.2[a]	46.4[a]

Bold and underline values * versus both LA2 and LA3.

Bold values * versus LA3 only.

Underline values * versus LA2 only.

[a] Value represents 1/2 reporting limit, since all replicates were ND.

ND = Not detected

Table 6. Mean Concentration of Detected Contaminants - *Nephtys caecoides* Bioaccumulation

	SOUTHWEST BASIN 2001			
Analytical Parameter	B TOP	B BOT	LA2	LA3
METALS (mg/Kg, dry wt)				
Arsenic	**20.0**	**17.6**	15.6	14.6
Cadmium	**1.02**	**0.94**	0.74	0.69
Chromium	**6.74**	2.88	0.66	0.66
Copper	11.9	11.4	8.4	5.8
Lead	**3.74**	ND	0.30[a]	0.30[a]
Nickel	**8.56**	5.78	3.86	3.36
Selenium	**3.06**	2.70	2.40	2.34
Zinc	**176**	**130**	114	95
SEMI-VOLATILES (ppb, dry wt)				
Acenaphthene	78.2	ND	28.0[a]	29.4[a]
Acenaphthylene	40.4	ND	28.0[a]	29.4[a]
Fluorene	92.2	ND	28.0[a]	29.4[a]
Phenanthrene	1602[b]	ND	28.0[a]	29.4[a]
Anthracene	**486**	ND	28.0[a]	29.4[a]
Fluoranthene	3128[b]	ND	28.0[a]	29.4[a]
Pyrene	3164[b]	ND	28.0[a]	29.4[a]
Benzo(a)anthracene	1310[b]	ND	28.0[a]	29.4[a]
Chrysene	**2010**	48.4	28.0[a]	29.4[a]
Perylene	**498**	ND	28.0[a]	29.4[a]
Benzo(b)fluoranthene	**2900**	130.4	28.0[a]	29.4[a]
Benzo(k)fluoranthene	**2460**	130.4	28.0[a]	29.4[a]
Benzo(a)pyrene	**2440**	114.4	28.0[a]	29.4[a]
Indeno[1,2,3-CD]pyrene	**1404**	82	56.3[a]	59.0[a]
Dibenzo(a,h)anthracene	**382**	ND	56.3[a]	59.0[a]
Benzo[ghi]perylene	**1252**	54.4	28.0[a]	29.4[a]
Total detectable PAHs	**25320**	424	28.0[a]	29.4[a]
CHLORINATED PESTICIDES (ppb, dry weight)				
DDE	**143**	9.4	58.8	59.4
Endosulfan I	8.7	ND	5.5[a]	5.9[a]
Endosulfan II	11.5	ND	5.5[a]	5.9[a]
Dieldrin	10.2	ND	5.5[a]	
PCBs (ppb, dry weight)				
Aroclor 1254	**1140**	ND	27.8[a]	29.2[a]

Bold and underline values * versus both LA2 and LA3.

Underline values * versus LA3 only.

[a] Value represents 1/2 reporting limit, since all replicates were ND.

[b] Not statistically significant due to large variance within the B-TOP group of five replicate samples.

ND = Not detected

Table 7. DI-WET Chemistry Results: Port of Los Angeles - Southwest Slip Project. (all values in µg/L)

Analytical Parameter	B Top Comp	C Top Comp	C Bot Comp	D Comp	WQS Salt Water Max EPA 2000	WQS Salt Water Cont EPA 2000
METALS (µg/L, wet wt)						
Arsenic	--	--	--	--		
Cadmium	--	--	--	--		
Chromium	--	--	--	--		
Copper	--	**16.0**	--	--	4.8	3
Lead	1U	1U	1U	1U	210	8.1
Mercury	--	**0.23**	**0.36**	--	0.16(a)	0.04(b)
Nickel	--	--	--	--		
Selenium	--	--	--	--		
Silver	--	--	--	--		
Zinc	--	--	--	--		

a. Mercury values not established under the California Toxics Rule. Value is the daily maximum from the 1997 Ocean Plan.

b. Mercury values not established under the California Toxics Rule. Value is the 6-month median from the 1997 Ocean Plan.

Bolded values equal or exceed the maximun 4 day average Water Quality Standard

Bolded and underlined values exceed the maximum 1 hour average Water Quality Standard

"U" Qualifier denotes analyte not detected at method detection limit

APPENDIX C

OUTER HARBOR

APPENDIX C-1

GRAB SAMPLE DATA, SHALLOW WATER HABITAT EXTENSION (Kinnetic Laboratories/ToxScan, 2001a)

Cabrillo Shallow Water Habitat Expansion Area

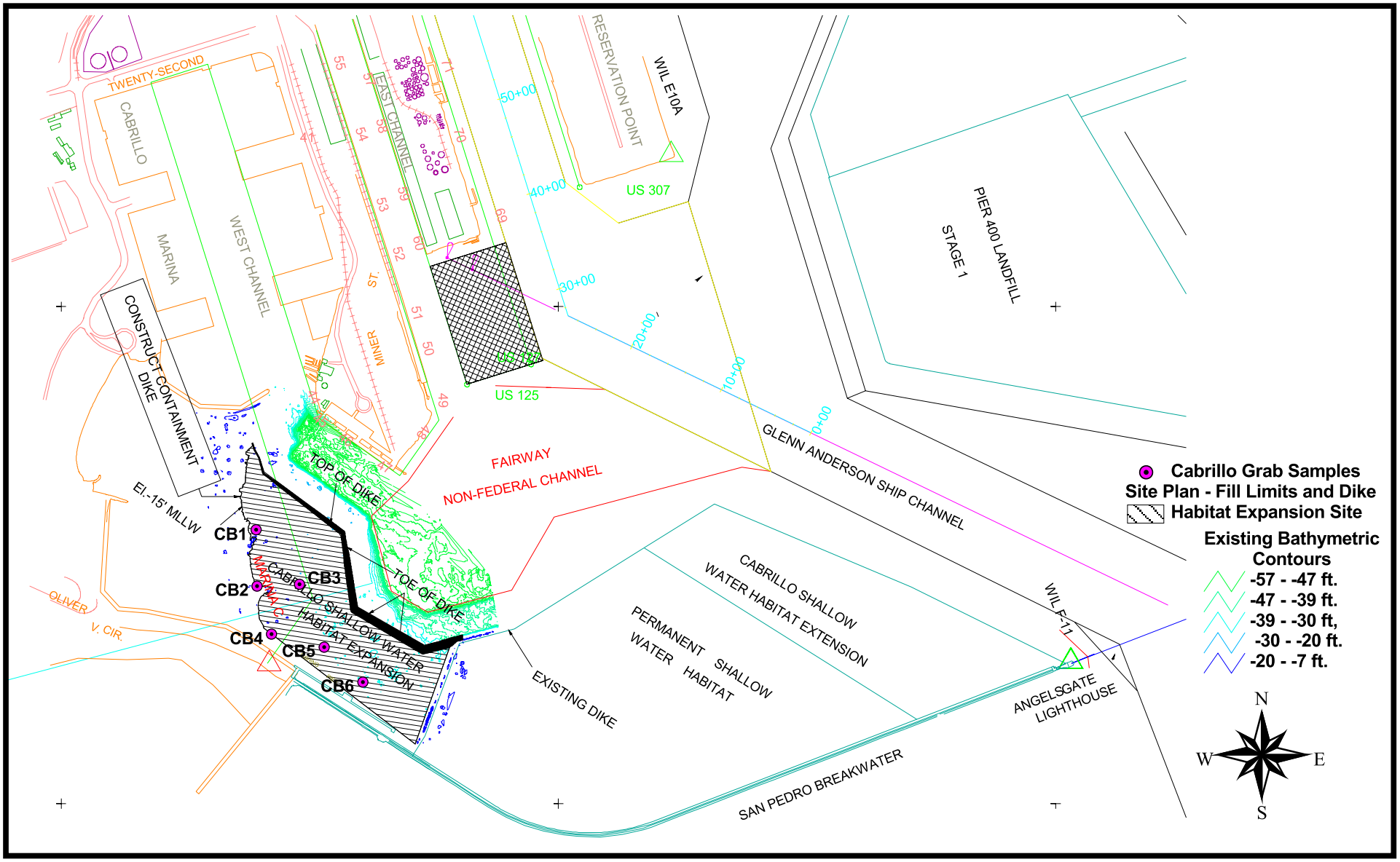


Table 1. Bulk Sediment Chemistry Results: Port of Los Angeles 2001 Deepening Project Cabrillo Shallow Water Habitat Expansion Area. Grab Samples. (Page 1 of 2)

Analytical Parameter	Cabrillo-1	Cabrillo-2	Cabrillo-3	Cabrillo-4	Cabrillo-5	Cabrillo-6	SW Slip - 5	Ref LA2	Ref LA3	ER-L 1995 (dry wt)	ER-M 1995 (dry wt)	Title 22 (wet wt)
GRAIN SIZE (% dry)												
Sand/Gravel (>0.063 mm)	15.3	22.9	10.9	39.2	5.6	12.9	39.6	80.9	7.6			
Silt (0.004 mm - 0.063 mm)	60.5	48.6	59.1	49.5	52.8	43.9	32.5	14.5	64.4			
Clay (<0.004 mm)	24.2	28.6	30.0	11.3	41.6	43.2	27.9	4.6	28.0			
SEDIMENT CONVENTIONALS												
Ammonia (mg/Kg)	18	34	22	12	25	14	93	10U	15			
Total sulfides (mg/Kg, dry)	2.9	8.5	16.00	4.80	7.60	13	790	0.1U	0.44			
Total Volatile Solids (%)	4.80	5.80	5.00	3.00	6.20	6.10	5.90	1.70	6.10			
Water soluble sulfides (mg/Kg, dry)	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U			
Oil and Grease (mg/Kg, dry)	1500	640	1400	320	520	360	3900	120	150			
TRPH (mg/Kg, dry)	360	240	540	160	240	280	1000	100U	100U			
% Solids (%)	46	44	43	58	45	46	47	69	46			
TOC (%)	3.12	3.48	2.68	1.29	2.46	2.17	2.80	0.47	1.81			
METALS (mg/Kg, dry wt)												
Arsenic	**12J**	**15J**	**13J**	**11J**	**11J**	**12J**	**13J**	2.9J	5.6J	8.2	70	500
Cadmium	**1.6**	**1.4**	**1.2**	0.52	**1.5**	0.79	2.8	0.22	0.81	1.2	9.60	100
Chromium	66	72	75	41	58	68	**180**	29	46	81	370	2500
Copper	**140**	**96**	**140**	**47**	**82**	**88**	**290**	12	20	34	270	2500
Lead	**55**	38	46	30	43	43	**360**	13	14	47	218	1000
Mercury	**0.83**	**0.81**	**1.6**	**1.0**	**0.78**	**0.52**	**1.3**	0.02U	0.066	0.15	0.71	20
Nickel	**27**	**27**	**31**	12	**21**	**26**	**69**	10	18	20.9	51.6	2000
Selenium	0.24	0.22	0.26	0.10	0.13	0.11	0.1U	0.1U	0.1U			100
Silver	0.70	0.64	0.61	0.14	0.44	0.48	0.74	0.1U	0.1U	1.0	3.7	500
Zinc	**190**	140	**160**	88	**150**	130	**730**	54	77	150	410	5000
ORGANOTINS (ppb, dry weight)												
Dibutyltin	9.8	4.1	7.7	1U	12.0	2.6	200.0	1U	1U			
Monobutyltin	1U	1U	1U	1U	1U	1U	7.2	1U	1U			
Tetrabutyltin	1U	1U	1U	3.4	1U	1U	1U	1U	1U			
Tributyltin	2.4	1U	6.5	1U	13.0	1U	94.0	2.2	1U			
CHLORINATED PESTICIDES (ppb, dry weight)												
Aldrin	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			1400
alpha-BHC	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			
beta-BHC	8.3	7	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			
delta-BHC	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			
gamma-BHC (lindane)	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			4000
alpha-Chlordane	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			2500
gamma-Chlordane	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	4.2	1.5U	2.2U			2500
4,4'-DDD	7	5.2	6.6	2.4	5.1	5.4	23	1.5U	2.2U			
4,4'-DDE	**130**	**99**	**160**	**53**	**150**	**130**	**83**	**6**	**7.2**	2.2	27	
4,4'-DDT	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			
Total DDTs	**137**	**104.2**	**166.6**	**55.4**	**155.1**	**135.4**	**106**	**6**	**7.2**	1.58	46.1	1000

Bold values equal or exceed the ERL.
Bold and underlined values equal or exceed the ERM.
Boxed values equal or exceed the San Francisco Bay Threshold.
Comp C contains cores B5 and B6

"U" Qualifier denotes analyte not detected at method detection limit
"U*" Qualifier denotes reporting limit raised due to matrix interference
" J " Qualifier denotes analyte concentration reported as an estimate

Table 1. Bulk Sediment Chemistry Results: Port of Los Angeles 2001 Deepening Project Cabrillo Shallow Water Habitat Expansion Area. Grab Samples. (Page 2 of 2)

Analytical Parameter	Cabrillo-1	Cabrillo-2	Cabrillo-3	Cabrillo-4	Cabrillo-5	Cabrillo-6	SW Slip -5	Ref LA2	Ref LA3	ER-L 1995 (dry wt)	ER-M 1995 (dry wt)	Title 22 (wet wt)
CHLORINATED PESTICIDES (Continued)												
Dieldrin	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			
Endosulfan I	2.2U	20	28	8.9	4.6	5.6	2.1U	1.5U	2.2U			
Endosulfan II	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	23	1.5U	2.2U			
Endosulfan sulfate	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	2.8	2.2U			
Endrin	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			
Endrin Aldehyde	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			
Endrin Ketone	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			
Heptachlor	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	3.8	1.5U	2.2U			
Heptachlor epoxide	2.2U	2.3U	2.4U	1.7U	2.2U	2.2U	2.1U	1.5U	2.2U			
Toxaphene	22U	23U	24U	17U	22U	22U	21U	15U	22U			
Methoxychor	4.4U	4.5U	4.7U	3.4U	4.4U	4.4U	4.2U	2.9U	4.4U			
PCBs (ppb, dry weight)												
PCB 1242	11U	11U	12U	8.6U	11U	11U	11U	7.3U	11U			
PCB 1248	11U	11U	12U	8.6U	11U	11U	11U	7.3U	11U			
PCB 1254	110	88	100	33	88	75	780	7.3U	11U			
PCB 1260	11U	11U	12U	8.6U	11U	11U	11U	7.3U	11U			
Total PCBs	**110**	**88**	**100**	**33**	**88**	**75**	**780**	7.3U	11U	22.7	180	50000
SEMI-VOLATILES (ppb, dry wt)												
Naphthalene	20	11U	14	8.6U	14	11U	30	7.3U	11U	160	2100	
Acenaphthylene	12	11U	12U	8.7	11U	11U	**420**	7.3U	11U	44	640	
Acenaphthene	13	11U	12U	8.6U	11U	11U	51	7.3U	11U			
Fluorene	**20**	11U	**19**	8.6U	12	11U	**230**	7.3U	11U	19	540	
Phenanthrene	83	32	66	27	57	45	**1100**	7.3U	11U	240	1500	
Anthracene	68	38	63	33	60	45	**1400**	7.3U	11U	85.3	1100	
Fluoranthene	240	220	220	110	200	180	**1300**	7.3U	14	600	5100	
Pyrene	310	180	260	140	270	260	**17000**	92U	140U	665	2600	
Benzo(a)anthracene	190	140	180	79	150	120	**3600**	22U*	15	261	1600	
Chrysene	330	190	240	100	210	200	**8500**	22U*	26	384	2800	
Benzo(b)fluoranthene	440	190	470	150	380	240	23000	36U*	22U*			
Benzo(k)fluoranthene	330	160	94U*	110	55U*	170	21000	36U*	22U*			
Benzo(a)pyrene	**810**	230	**680**	140	380	260	**23000**	44U*	44	430	1600	
Indeno[1,2,3-CD]pyrene	130U*	130	120	68U*	66U*	54U*	14000	66U*	22U			
Dibenzo(a,h)anthracene	130U*	45U*	71U*	60U*	55U*	54U*	**5300**	51U*	22U	63.4	260	
Benzo[ghi]perylene	280	120U*	82U*	94U*	120U*	120U*	9100	80U*	120U*			
Benzo(e)pyrene	570	180	470	140	290	260	17000	44U*	35			
Total detectable PAHs	3700	1700	2800	1000	2000	1800	**150000**	13U	130	4022	44792	
Total Phthalates	410	27	120	320	110	110	150	110	160	1700	9600	
Total Phenols	22U	99	82	41	380	140	42	23	24			

Bold values equal or exceed the ERL.

Bold and underlined values equal or exceed the ERM.

Boxed values equal or exceed the San Francisco Bay Threshold.

Comp C contains cores B5 and B6

"U" Qualifier denotes analyte not detected at method detection limit

"U*" Qualifier denotes reporting limit raised due to matrix interference

Table 2. Elutriate Chemistry Results: Port of Los Angeles 2001 Deepening Project Cabrillo Shallow Water Habitat Expansion Area. (Page 1 of 2)

Analytical Parameter	Cabrillo Compostie Area	(Salt Water)	WQS Salt Water Max EPA 2000	WQS Salt Water Cont EPA 2000
CONVENTIONALS				
Ammonia (mg/L)	0.97	0.1U		
Water soluble sulfides (mg/L)	0.1U	0.1U		
Oil and Grease (mg/L)	5U	5U		
METALS (µg/L, wet wt)				
Arsenic	8.5	0.95	69	36
Cadmium	0.1U	0.1U	42	9.3
Chromium	12	12	1100	50
Copper	**5.1**	**4.7**	4.8	3.1
Lead	1U	1U	210	8.1
Mercury	0.033	0.034	0.16(a)	0.04 (b)
Nickel	**13**	**10**	74.0	8.2
Selenium	1U	1U	290	71
Silver	0.26	0.31	1.90	
Zinc	9.0	9.9	90	81
ORGANOTINS (ppt (ng/L) wet weight)				
Dibutyltin	2U	2U		
Monobutyltin	2UR	2UR		
Tetrabutyltin	2U	2U		
Tributyltin	2U	2U		
CHLORINATED PESTICIDES (ppb, wet weight)				
Aldrin	0.05U	0.05U	1.3	
alpha-BHC	0.02U	0.02U		
beta-BHC	0.02U	0.02U		
delta-BHC	0.02U	0.02U		
gamma-BHC (lindane)	0.02U	0.02U	0.16	
alpha-Chlordane	0.02U	0.02U	0.09	0.004
gamma-Chlordane	0.02U	0.02U	0.09	0.004
4,4'-DDD	0.02U	0.02U		
4,4'-DDE	0.02U	0.02U		
4,4'-DDT	0.02U	0.02U	0.13	0.001
Total DDTs	0.02U	0.02U		

a. Mercury values not established under the ("U" Qualifier denotes analyte not detected at method detection limit

b. Mercury values not established under the California Toxics Rule. Value is the 6-month median from the 1997 Ocean Plan.

Bolded values equal or exceed the maximun 4 day average Water Quality Standard

Bolded and underlined values exceed the maximum 1 hour average Water Quality Standard

Table 2. Elutriate Chemistry Results: Port of Los Angeles 2001 Deepening Project Cabrillo Shallow Water Habitat Expansion Area. (Page 2 of 2)

Analytical Parameter	Cabrillo Compostie Area	(Salt Water)	WQS Salt Water Max EPA 2000	WQS Salt Water Cont EPA 2000
CHLORINATED PESTICIDES (Continued)				
Dieldrin	0.02U	0.02U	0.71	0.0019
Endosulfan I	0.02U	0.02U	0.034	0.0087
Endosulfan II	0.02U	0.02U	0.034	0.0087
Endosulfan sulfate	0.02U	0.02U		
Endrin	0.02U	0.02U	0.037	0.0023
Endrin Aldehyde	0.02U	0.02U		
Endrin Ketone	0.02U	0.02U		
Heptachlor	0.02U	0.02U		
Heptachlor epoxide	0.02U	0.02U		
Toxaphene	0.5U	0.5U		
Methoxychor	0.05U	0.05U		
PCBs (ppb, wet weight)				
PCB 1242	0.5U	0.5U		
PCB 1248	0.5U	0.5U		
PCB 1254	0.5U	0.5U		
PCB 1260	0.5U	0.5U		
Total PCBs	0.5U	0.5U		0.03
SEMI-VOLATILES (ppb, wet wt)				
Naphthalene	0.1U	0.1U		
Acenaphthylene	0.1U	0.1U		
Acenaphthene	0.1U	0.1U		
Fluorene	0.1U	0.1U		
Phenanthrene	0.1U	0.1U		
Anthracene	0.1U	0.1U		
Fluoranthene	0.1U	0.1U		
Pyrene	0.1U	0.1U		
Benzo(a)anthracene	0.1U	0.1U		
Chrysene	0.1U	0.1U		
Benzo(b)fluoranthene	0.1U	0.1U		
Benzo(k)fluoranthene	0.1U	0.1U		
Benzo(a)pyrene	0.1U	0.1U		
Indeno[1,2,3-CD]pyrene	0.2U	0.2U		
Dibenzo(a,h)anthracene	0.2U	0.2U		
Benzo[ghi]perylene	0.2U	0.2U		
Total detectable PAHs	0.1U	0.1U		15
Total Phenols	0.2U	0.2U		

Bolded values equal or exceed the maximun 4 day average Water Quality Standard

Bolded and underlined values exceed the maximum 1 hour average Water Quality Standard

APPENDIX C-2

PREVIOUS SEDIMENT QUALITY DATA FROM THE AREA OF THE PROPOSED CABRILLO SHALLOW WATER HABITAT EXTENSION AND FROM THE PROPOSED PIER 400 SUBMERGED MATERIALS STORAGE AREA (Kinnetic Laboratories, Inc. 1991)

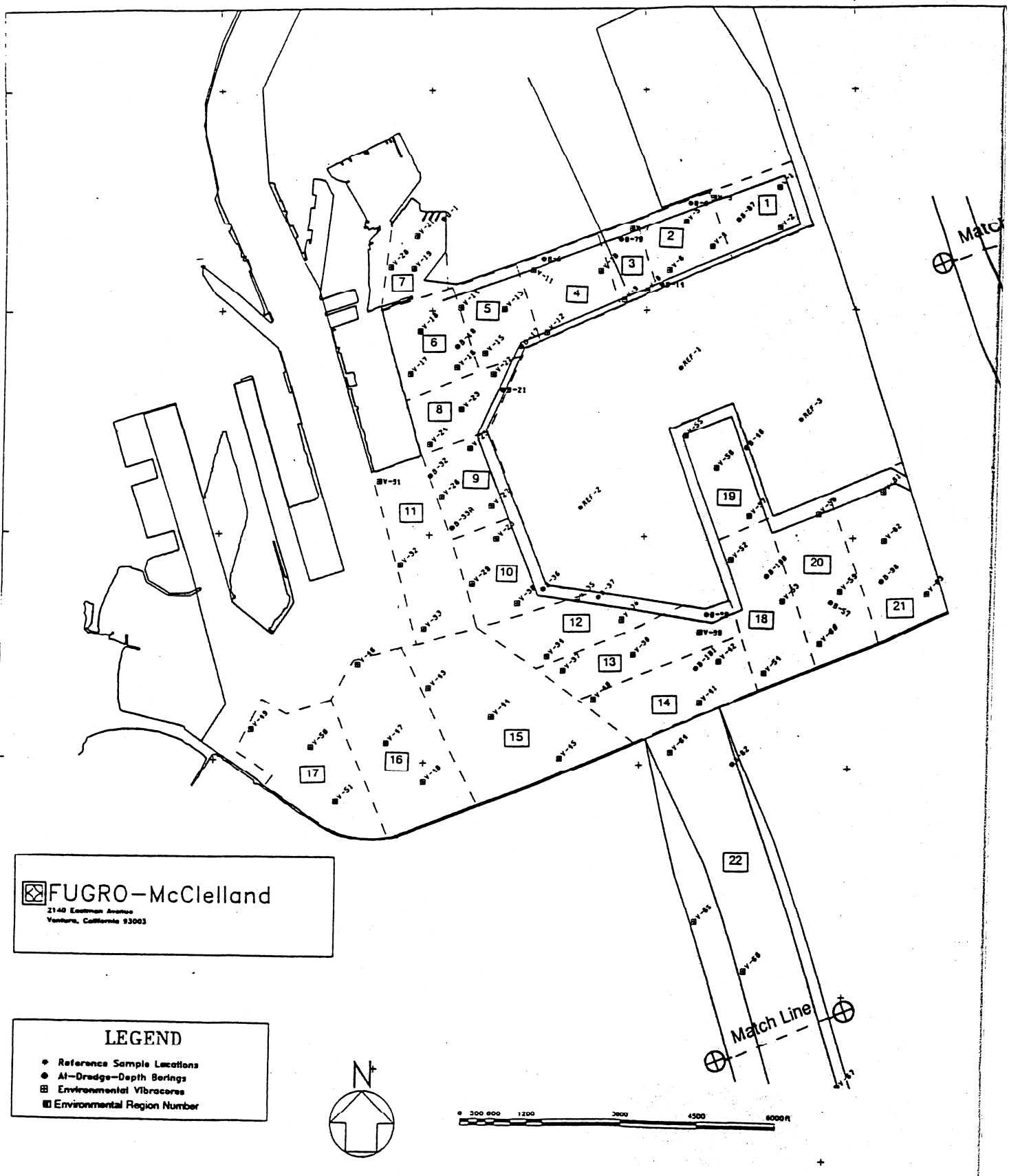


FIGURE 1. Summary of Vibracoring Operations

Table 1. Bulk Sediment Chemistry Results: POLA 2020 Plan - Geotechnical Investigations, Environmental Tasks. Vibracore samples. (Kinnetic Laboratories/ToxScan, Inc. 1991). (Page 1 of 2)

Analytical Parameter	AREA 16 TOP	AREA 16 MID	AREA 16 BOT	AREA 17 TOP	AREA 17 MID	AREA 17 BOT	AREA 20 TOP	AREA 20 MID	AREA 20 BOT	AREA 21 TOP	AREA 21 MID	AREA 21 BOT
GRAIN SIZE (% dry)												
Sand/Gravel (>0.063 mm)	18.6	5.4	42.0	16.5	2.0	7.8	65.2	90.5	73.4	49.6	91.1	87.7
Silt (0.004 mm - 0.063 mm)	50.3	54.0	32.9	50.3	54.7	51.1	24.1	7.3	20.4	35.0	7.0	8.9
Clay (<0.004 mm)	31.1	40.6	19.1	33.2	43.3	41.1	10.7	2.2	6.2	15.4	1.9	3.4
SEDIMENT CONVENTIONALS												
Total sulfides (mg/Kg, dry)	0.3	ND	468.0	974	633	1.4	5.4	89	0.5	5.7	18	5.7
Water soluble sulfides (mg/Kg, dry)	ND	ND	ND	0.4	0.3	0.4	0.3	0.5	ND	ND	ND	ND
Oil and Grease (mg/Kg, dry)	3.9	17.1	3.8	26.5	31.0	14.3	14.2	3.2	1.3	11.2	1.3	1.3
TRPH (mg/Kg, dry)	12	35	19	50	64	29	24	13	15	19	17	15
% Solids (%)	64	59	66	58	50	53	71	78	77	68	79	80
TOC (%)	1.5	1.6	1.7	1.7	1.2	2.2	0.8	0.4	0.5	0.8	0.4	0.4
METALS (mg/Kg, dry wt)												
Arsenic	**12.0**	**14.0**	**9.0**	**16.0**	**14.0**	**15.0**	7.8	2.1	2.0	**8.6**	2.2	2.8
Cadmium	**1.2**	0.6	0.8	1.0	0.8	**1.2**	0.5	ND	0.1	0.5	0.2	0.1
Chromium	**99**	79	57	**110**	**87**	**120**	51	23	32	59	27	28
Copper	**66**	**67**	28	**120**	**77**	**82**	29	6.8	16	**35**	8.5	6.3
Lead	13	43	3.3	45	38	22	23	1.0	1.9	24	1.7	0.5
Mercury	**0.26**	**1.10**	0.09	**0.68**	**1.00**	**0.73**	**0.26**	0.03	0.04	**0.33**	0.03	0.02
Nickel	**41**	**30**	**26**	**36**	**37**	**55**	15	9.0	14	19	9.7	10
Selenium	5.22	0.93	1.83	2.24	1.65	5.94	0.34	0.06	0.07	0.39	0.07	0.09
Silver	**1.5**	**1.5**	**1.2**	**1.9**	**1.5**	**1.7**	0.9	0.4	0.5	**1.0**	0.6	0.5
Zinc	140	**180**	82	**210**	**180**	**180**	92	37	56	110	41	37
ORGANOTINS (ppb, dry weight)												
Dibutyltin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Monobutyltin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrabutyltin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tributyltin	ND	ND	ND	2.0	ND	3.6	ND	ND	ND	ND	ND	ND
CHLORINATED PESTICIDES (ppb, dry wt)												
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
alpha-Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE	**120**	**24**	ND	**520**	**45**	**61**	**410**	ND	ND	**300**	**270**	ND
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total DDTs	**120**	**24**	ND	**520**	**45**	**61**	**410**	ND	ND	**300**	**270**	ND

Bolded values equal or exceed the ERL.

Bolded and underlined values equal or exceed the ERM.

Table 1. Bulk Sediment Chemistry Results: POLA 2020 Plan - Geotechnical Investigations, Environmental Tasks. Vibracore samples. (Kinnetic Laboratories/ToxScan, Inc. 1991). (Page 2 of 2)

Analytical Parameter	AREA 16 TOP	AREA 16 MID	AREA 16 BOT	AREA 17 TOP	AREA 17 MID	AREA 17 BOT	AREA 20 TOP	AREA 20 MID	AREA 20 BOT	AREA 21 TOP	AREA 21 MID	AREA 21 BOT
CHLORINATED PESTICIDES (Continued)												
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCBs (ppb, dry weight)												
PCB 1242	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB 1254	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB 1260	ND	ND	ND	ND	ND	ND	ND	1600	ND	ND	ND	ND
Total PCBs	ND	ND	ND	ND	ND	ND	ND	1600	ND	ND	ND	ND
SEMI-VOLATILES (ppb, dry wt)												
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ND	**36.8**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	43.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	130	ND	42.1	74	ND	29.3	ND	ND	ND	ND	ND
Pyrene	ND	163	31.2	63.1	105	43.4	37.7	ND	ND	36.9	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	ND	73.2	ND	ND	43.7	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	138	ND	123	72	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	131	ND	100	82.5	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	**436**	139	**767**	109	290	ND	ND	ND	ND	ND	ND	ND
Indeno[1,2,3-CD]pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[ghi]perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(e)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total detectable PAHs	436	855	798	437	667	43.4	67.0	ND	ND	36.9	ND	ND
Total Phthalates	ND	ND	ND	17.7	ND	ND	ND	64.2	ND	250.0	ND	ND
Total Phenols	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Bolded values equal or exceed the ERL.

Table 2. Toxicity Results: POLA 2020 Plan - Geotechnical Investigation, Environmental Tasks (Kinnetic Laboratories/ToxScan, Inc. 1991).

	AREA 16 TOP	AREA 16 MID	AREA 16 BOT	AREA 17 TOP	AREA 17 MID	AREA 17 BOT	AREA 20 TOP	AREA 20 MID	AREA 20 BOT	AREA 21 TOP	AREA 21 MID	AREA 21 BOT
Water Column Bioassays (100%, 50% & 10% Elutriate)												
Crassostrea gigas Survival (100% Elutriate)	108.9	99.2	103.6	98.3	104.0	93.0	111.4	99.6	87.7	106.1	93.8	98.8
Crassostrea gigas Survival (50% Elutriate)	89.9	105.5	102.3	100.3	103.0	94.4	102.6	101.8	105.7	112.7	96.5	106.4
Crassostrea gigas Survival (10% Elutriate)	114.6	95.7	93.2	94.5	106.4	98.2	99.4	106.8	102.3	96.9	103.6	98.8
Control Survival	99	99	99	99	99	99	99	99	99	99	99	99
Crassostrea gigas Development (100% Elutriate)	94.7	93.9	95.1	99.3	92.9	93.9	93.1	96.2	95.3	96.2	93.1	90.0
Crassostrea gigas Development (50% Elutriate)	96.1	91.0	94.3	95.1	94.3	92.3	97.4	96.4	96.0	92.6	97.3	93.8
Crassostrea gigas Development (10% Elutriate)	95.2	95.2	96.3	95.5	97.3	95.2	96.4	95.3	97.7	95.8	95.9	92.2
Control Development	96	96	96	96	96	96	96	96	96	96	96	96
Benthic Bioassays (% Survival, % Reburial)												
Grandidierella japonica Reburial	86.7	79.2	85.2	81.6	92.5	88.6	91.9	77	92.7	85.4	88.5	90.5
Grandidierella japonica Survival	90	94	92	97	93	87	96	93	89	96	87	85
Control Survival	90	90	90	90	90	90	90	90	90	90	90	90

Signature Not Verified

Peter Wilde

Digitally signed by Peter Wilde
DN: cn=Peter Wilde, o=Kinnetic Laboratories, ou=Santa Cruz Branch, c=US
Date: 2002.01.19 18:13:34 -08'00'
Reason: Document is released
Location: Santa Cruz